Smithsonian

July 1985

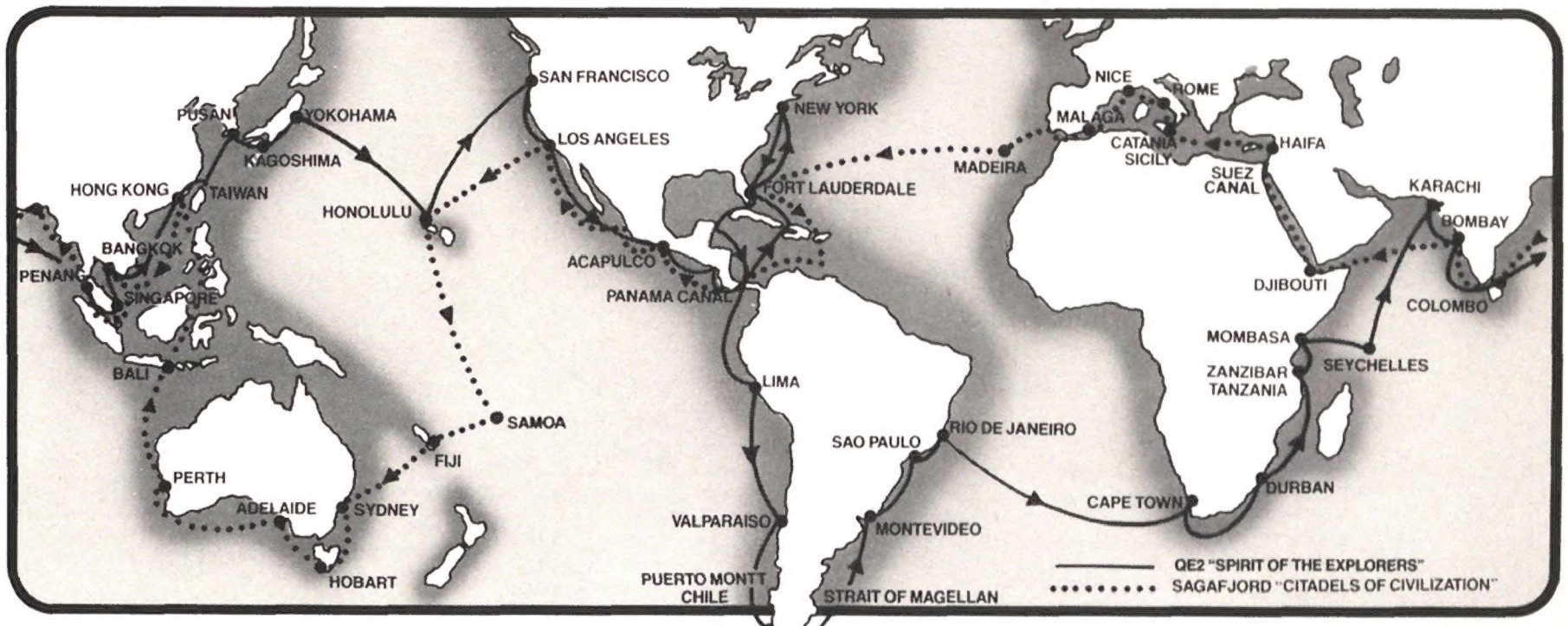
The Boy Scouts at 75

Norman Rockwell painted this jaunty youth for the 1959 Scout *Handbook* (p. 32)

SOME CIRCLES SHALL REMAIN EXCLUSIVE.

The ultimate recognition from your banker. A gold MasterCard card.

THE WORLD'S TOP-RATED SHIPS BRING YOU THE BEST OF THE WORLD. TWICE.



IN 1986, QE2 AND SAGAFJORD OFFER YOU WARM-WEATHER WORLD CRUISE VACATIONS OF 2 WEEKS TO 3 MONTHS.

"Spirit of the Explorers" on QE2.

The Queen Elizabeth 2 sets sail from New York on Jan. 15 (Florida, Jan.17) for the Panama Canal and a circuit of South America, including maiden arrivals in Peru and Chile, and the great ship's inaugural transit of the Strait of Magellan. Explore Africa, India, Indonesia and the Orient. Sail home via Hawaii to Los Angeles, Florida or New York. All in all, 29 incomparable ports of call, 12 of them overnight, in 81 glorious days.

"Citadels of Civilization" on Sagafjord.

Board Sagafjord in Florida on Jan. 6; depart Los Angeles for the South Seas on Jan. 20. After an intriguing coastal exploration of Australia, voyage in Five-Plus Star luxury through Indonesia, Asia, India, the Middle East and the Mediterranean. All told, 28 fascinating ports of call—seven of them overnight—in 88 unforgettable days (embarking in Los Angeles, disembarking in Florida).

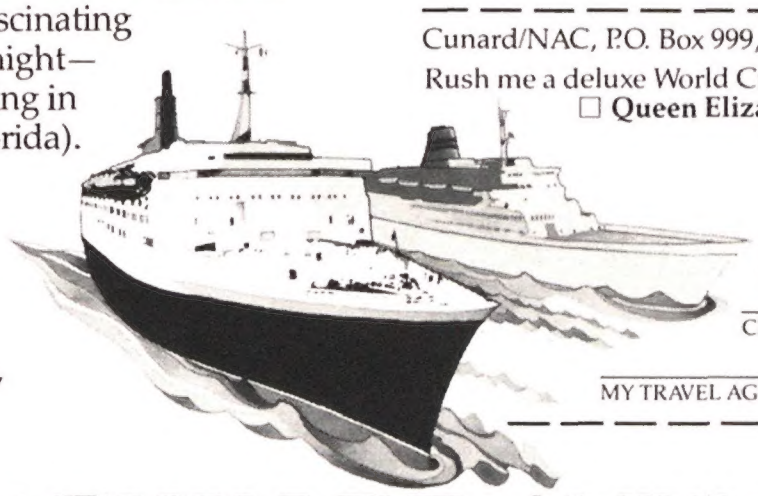
Your luxury hotel travels with you.

In the new *Fielding's Worldwide Cruises*, author Antoinette DeLand awards its highest rating, Five-Plus Stars, only twice: to Sagafjord, noted for personalized service, and to three of the four restaurants and their corresponding accommodations aboard QE2.

On QE2 and Sagafjord, you enjoy superb, single-seating dining; a casino, cinema and Indoor/Outdoor Center with entertainment day and night; indoor and outdoor pools, sauna, gym, Jacuzzi® Whirlpool Baths and the famed "Golden Door Spa at Sea." ®

Sagafjord offers free airfare. QE2 offers free or low-cost airfare, plus low-cost specially reserved British Airways' Concorde flights serving Lima, Rio, Cape Town, Hong Kong and Bombay. For details, consult your travel agent or Cunard.

QE2 is registered in Great Britain; Sagafjord is registered in the Bahamas.



Cunard/NAC, P.O. Box 999, Farmingdale, NY 11737.

Rush me a deluxe World Cruise brochure:

☐ **Queen Elizabeth 2** (Q736) ☐ **Sagafjord** (Q738)

NAME

ADDRESS, APT. NO.

CITY STATE/ZIP

MY TRAVEL AGENT E17182

CUNARD /NAC

© CUNARD 1985

WORLD CRUISING: WE DID IT FIRST, WE DO IT BEST.

July 1985

Smithsonian

Volume 16, Number 4

Table of Contents

Cover: On their 75th anniversary the Boy Scouts are still swinging along, but with a difference (p. 32)
Photograph courtesy of Boy Scouts of America

10 *Smithsonian horizons* by Secretary Adams
12 *Letters to the Editor*
20 *Around the Mall and beyond* by Edwards Park
22 *Picture credits*
26 *Phenomena, comment and notes* by John P. Wiley jr.

32 **Putting the outing back into Scouting**
After trying too hard for "relevance," the Boy Scouts are going back to what made them successful
By Don Moser

46 **Trees are living archives**
And their growth rings give clues to everything from historical dates to volcanic eruptions
By James S. Trefil
Color photographs by Terrence Moore

58 **Kensett's vision of the American land**
Successful in his lifetime, then ignored, the painter's work stirs up interest with a new show
By Don Lessem

68 **Aphids: the business of begetting**
They reproduce in every way imaginable, leaving our sophisticated control techniques far behind
By David M. Schwartz
Photographs by Dwight R. Kuhn

78 **Jitter, shimmer and blip**
Denver's Recording and Research Center is finding new terms for old vocal problems
By Donald Dale Jackson, photographs by James Balog

91 **'Dr. Truck' on the road**
An anthropologist's study of independent truckers finds a wide gap between their image and reality
By Richard Wolkomir, photographs by Kay Chernush

100 **A house where nothing was ever thrown away**
Calke Abbey simply filled up; now it is being exhumed and catalogued for the National Trust
By Israel Shenker, photographs by Michael Freeman

114 **An ingenious way to look at life's basic molecules**
Robert Langridge uses computer graphics to model DNA and proteins in three dimensions
By Terence Monmaney

122 **The 'melancholy action' at Mers-el-Kebir**
When the British hit French warships near Oran in 1940, did it alter the course of World War II?
By Alistair Horne

140 *Book reviews*
145 *Additional reading*
147 *July events at the Smithsonian*
150 *Smithsonian tours*

152 **If you've got the legs for it, guys . . .**
By Kay Haugaard

Smithsonian (ISSN 0037-7333) is published monthly
by the Smithsonian Associates, 900 Jefferson Drive, Washington, DC 20560.
© Smithsonian Institution 1985. All rights reserved.
Reproduction in whole or in part without permission is prohibited.
Subscription price $18 a year in U.S. possessions, $30 elsewhere. 80 percent of dues is designated for magazine subscription. Single copy price, $2.50.
Second-class postage paid at Washington, DC, and additional entry points.
Editorial offices at 900 Jefferson Drive, Washington, DC 20560.
Advertising and circulation offices at 420 Lexington Ave., New York, NY 10170.
Members: Please address all subscription correspondence and change of address information to P.O. Box 2955, Boulder, CO 80322.
Postmaster: Send 3579s to P.O. Box 2955, Boulder, CO 80302.

The Straightaway.

The Hairpin.

The S's.

The Loop.

The 1985 Honda Accord Hatchback has a powerful 12-valve engine to speed you down the Straightaway at the Daytona Speedway. It has front-wheel drive to pull you through the Hairpin at Sears Point Raceway. A special sport suspension that can straighten out the S's at Lime Rock Park. And a long list of standard features to take you in comfort through The Loop in Chicago.

HONDA

The Accord Hatchback

© 1984 American Honda Motor Co., Inc.

Picture yourself in the world of a Princess.

For reservations and information, see your travel agent or call 800-223-1818; in N.Y. State 800-442-8418; in N.Y. City 212-582-8100; in Canada 416-964-6641.

Southampton Princess
Bermuda

ACAPULCO: Acapulco Princess. Pierre Marques. BAHAMAS: Bahamas Princess Resort and Casino
BERMUDA: Southampton Princess. The Princess. Represented by Princess Hotels International, Inc.®

Get the only easy to understand, interesting and scientifically accurate

HALLEY'S COMET SELF TEACHING MODEL AND LOCATION FINDER

KNOW WHERE TO LOOK...
UNDERSTAND WHAT YOU SEE

Giant (33") 3 dimensional scale model of the inner solar system and intersecting comet orbit. Computer designed. Shows correct angle of inclination, eccentricity, line of nodes, argument of the perihelion and positions of earth and comet as students advance markers to daily positions indicated on orbits. Halley Finder (at left above) points out comet in your sky.

PLUS Astro Scales and Scholarly Pamphlet.

ORDER
The Halley's Comet Survival Kit

Send $*14.95*

Pa. Residents please add 6% sales tax

PERIHELION SCIENTIFIC
DEPT. R, BOX 1009
PAOLI, PA 19301

SAVE $15*
A Distinctive Discount

When you're visiting the Smithsonian museum complex, you'll find the Washington Plaza-Hotel a satisfying and affordable experience. And now save $15 off our already reasonable rates. Just present this special coupon at check-in.

We're minutes from the National Mall and Smithsonian. Our concierge provides information about showings, transportation, and more. Call for our complimentary brochure Toll Free **(800) 424-1140** and ask for this special package, for...a good deal. And a good deal more.SM

*Discount is per room per night and applies to published room rates only. One coupon per room. Subject to availability.

Everything a good hotel should be...except expensive.

WASHINGTON PLAZA-HOTEL
Massachusetts at Vermont Ave., N.W.
Washington, D.C. 20005 • (202) 842-1300

A HOWARD JOHNSON HOTEL

Smithsonian

SECRETARY OF THE SMITHSONIAN INSTITUTION:
Robert McC. Adams

EDITOR:
Don Moser

EXECUTIVE EDITOR:
Ralph Backlund

BOARD OF EDITORS:
Jim Doherty
Timothy Foote
Bennett Schiff
Nancy Seaman
Paul Trachtman
John P. Wiley jr.
Caroline Despard, Pictures

ASSOCIATE EDITORS:
Constance A. Bond
Frances R. Glennon
Marlane A. Liddell
Jane D. Scholl
Edgar Rich, Pictures

ASSISTANT EDITORS:
Susana Barañano
Diane M. Bolz
Kathleen M. Burke
Judy Harkison
Jane G. Sweeney

EDITORIAL ASSISTANT:
Charlene Mason

CONTRIBUTING EDITORS:
Edwards Park
Richard L. Williams

PUBLISHER:
Joseph J. Bonsignore

CIRCULATION:
Anne Keating, Associate Publisher
Adeline Sherr
John O'Donnell

ADVERTISING:
Thomas H. Black, Associate Publisher
Edward Daly
Lewis P. Ogle

ADMINISTRATION:
Carey O. Randall, Associate Publisher
Mary Ellen Bobb

PRINTING AND DISTRIBUTION:
E. Cherry Doyle

PRODUCTION:
Ruth Ravenel
Mary D. Haskin

EDITOR AND PUBLISHER EMERITUS:
Edward K. Thompson

FOUNDER:
S. Dillon Ripley

The Sight and Sound of

QUALITY

YOU CAN SEE AND HEAR

When you're this good, you put your warranties where your mouth is. That's why, overall, Hitachi probably has the finest limited warranty protection ever offered in home electronics products. Products that perform so well, you may never get a chance to see how good our warranties really are.

HITACHI

A World Leader in Technology

NEW SIGNAL TRACKER COMPONENT TV

Backed by Hitachi's incomparable 10/2/1 limited warranty, this state-of-the-art 20" diagonal flat square tube receiver/monitor integrates all your home entertainment functions. VCR, VideoDisc Player, stereo system, video games, home computer and total TV reception. Enjoy more on-screen picture and less distortion. And only Hitachi has Signal Tracker control, our most advanced color control system ever. With the handy wireless remote control and wood cabinetry you get ease of operation, great sound and quality good looks.

Simulated TV picture.

NEW COMPACT DIGITAL AUDIO DISC PLAYER

Only Hitachi, a world leader in advanced audio technology, offers Laser Life — a two year limited parts warranty for long term protection. Yours with the DA-600. With a three-spot laser pick-up servo system; wireless remote control that reads, selects, repeats, skips and scans; memory programming for up to 15 selections; slim-line, front load design.

NEW 5 + 2 HEAD HI-FI VCR

With Adjustomatic, a limited warranty superior to industry standards, the exceptional VT-89A VCR from Hitachi has brought hi-fi technology to video sound. Sound finer than any turntable or conventional tape deck...far superior to ordinary VCRs, it's sound you have to see to believe. Five video heads, two audio heads, cable ready, with a computer brain that guides you through every program function. Each step is displayed on your TV screen.

HITACHI

401 W. Artesia Blvd., Compton, CA 90220. (213) 537-8383

L.L.Bean®

Outdoor Sporting Specialties

FREE Fall Catalog

For men and women who enjoy the outdoors. Features active and casual apparel and footwear; hiking, camping, hunting and winter sports equipment. Fully illustrated. For 73 years L. L. Bean has been providing practical and functional merchandise. Many items of our own manufacture. All guaranteed to be 100% satisfactory. **We pay postage and handling charges.**

☐ **Send FREE Fall Catalog**

Name_____

Address_____

City_____

State_____ Zip_____

L. L. Bean, Inc.
1036 Casco St., Freeport, ME 04033

Have a banner day!®

A Great Gift!

Actual Unretouched Photograph

Order by Phone with VISA or MasterCard: (818) 716-0670 Outside California, call TOLL FREE: (800) 556-0670

Imagine their thrill receiving *your personal message* on a magnificent 15 foot long GiganticGram®! With red type on yellow paper, they're sensational for birthdays, weddings, anniversaries, or to say "I love you" in a big way! Also great for business signs and sales promotions. GiganticGrams are placed in the mail within 48 hours of receipt of order, unless a future mailing date is specified. *Satisfaction is unconditionally guaranteed.* Send name & address of recipient, message (up to 48 letters, spaces & hearts) and $8.95 for each banner to: Computer Greetings Corp., Dept. D541, 22019 Vanowen, Canoga Park, Calif. 91303.

Fitness Master LT-35

TOTAL SYSTEM FOR CARDIOVASCULAR FITNESS.

Simulates cross-country skiing, regarded by fitness authorities as the top cardiovascular exercise. Rated higher than jogging, swimming, biking or rowing.

- Fluid motion — no jarring impact on bones and joints. Avoids running related injuries.
- Excellent for weight control and body tone.
- Stable, unit rests flat on floor. Lightweight for portability. Weighs only 35 lbs.
- Easily stored. Folds to 5 inch height. Slips under a bed or stands upright in closet.
- 30 day home trial. 2 year warranty.

- Can be used by men and women regardless of size or weight. Height and resistance adjustable.

For a Free Brochure call:
TOLL FREE 1-800-328-8995
In Minnesota 1-612-474-0992
Fitness Master, Incorporated
1387 Park Road Dept. B3
Chanhassen, Minnesota 55317

Smithsonian

Board of Regents
Smithsonian Institution

Ex Officio

Chief Justice of the United States
Warren E. Burger, Chancellor
Vice President of the United States
George H. W. Bush

Appointed by the President of the Senate

Honorable E. J. (Jake) Garn
Honorable Barry M. Goldwater
Honorable James R. Sasser

Appointed by the Speaker of the House

Honorable Edward P. Boland
Honorable Silvio O. Conte
Honorable Norman Y. Mineta

Appointed by Joint Resolution of Congress

Honorable David C. Acheson
Honorable Anne L. Armstrong
Dr. William G. Bowen
Mrs. Jeannine Smith Clark
Dr. Murray Gell-Mann
Honorable A. Leon Higginbotham jr.
Mr. Carlisle H. Humelsine
Mr. Samuel C. Johnson

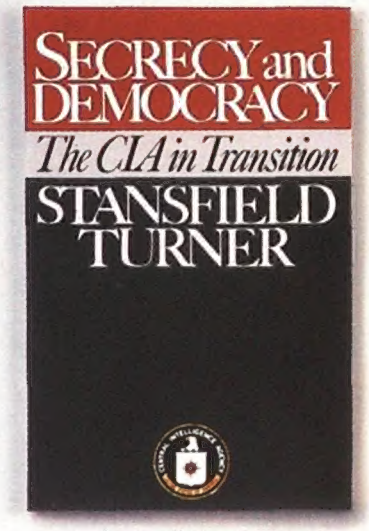
National Board of the Smithsonian Associates

Mr. Seymour H. Knox III, Chairman
Mrs. Joe L. Allbritton
Mr. Arthur G. Altschul
Mr. Perry R. Bass
Honorable Lucius D. Battle
Mr. William W. Boeschenstein
Mr. Frank T. Cary
Mr. James H. Clement
Mr. David L. Coffin
Mr. Charles D. Dickey jr.
Mrs. Robert Donner jr.
Mrs. Avery C. Faulkner
Mr. Marshall Field
Mr. W. L. Hadley Griffin
Mr. John F. Harrigan
Mr. S. Charles Kemp
Mr. Thomas M. Keresey
Mr. Howard M. Love
Mr. Brooks McCormick
Mr. Alexander K. McLanahan
Mr. Arjay Miller
Mr. Charles H. Murphy jr.
Mr. Jack S. Parker
Mr. Charles W. Schmidt
Mrs. George M. Seignious II
Mrs. Edson W. Spencer
Mr. Malcolm T. Stamper
Mrs. E. Hadley Stuart jr.
Mr. John C. Whitehead
Mr. J. Tylee Wilson
Mrs. Peter Wray

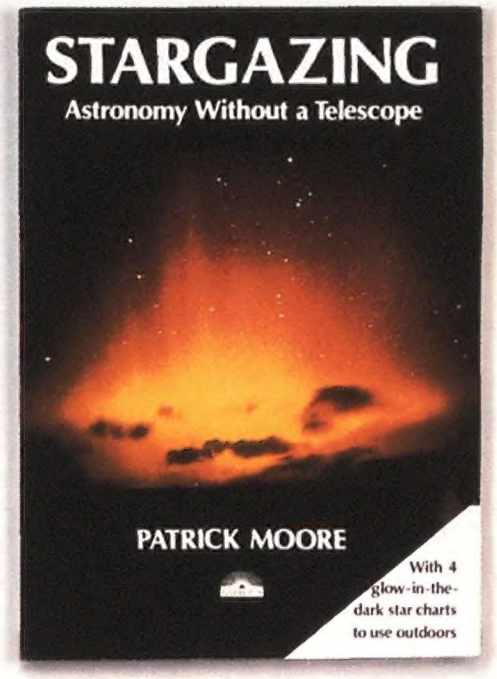
Honorary Members

Mr. William S. Anderson
Mr. Richard P. Cooley
Mr. Joseph F. Cullman III
Honorable Leonard K. Firestone
Mr. Alfred C. Glassell jr.
Honorable William A. Hewitt
Mr. James M. Kemper jr.
Mr. Lewis A. Lapham
Honorable George C. McGhee
Justice Sandra D. O'Connor
Mr. Francis C. Rooney jr.
Mr. Merritt Kirk Ruddock
Honorable Thomas J. Watson jr.

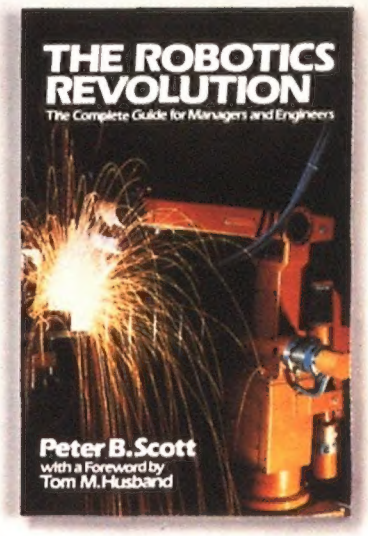
From Secret Disclosures to Traditional Tales



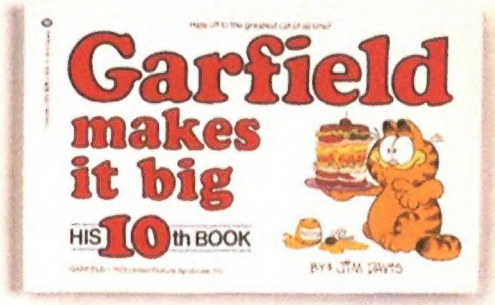
A candid look at America's intelligence agencies and the people who run them.
#8723 $16.95



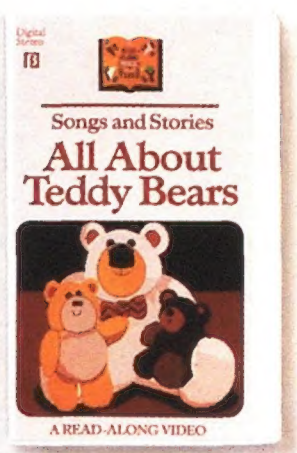
A superb reference book that shows how to "read" and chart stars without a telescope.
#8718 $19.95



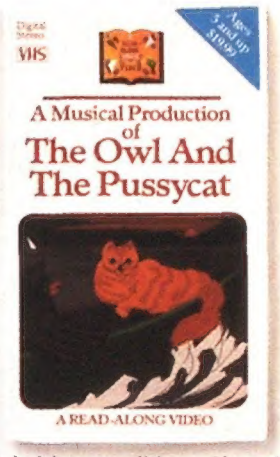
An insightful guide to the programming of robots and their impact on the way we live.
#8719 $24.95



Another hilarious addition to the Garfield series by syndicated cartoonist Jim Davis.
#8580 $5.95

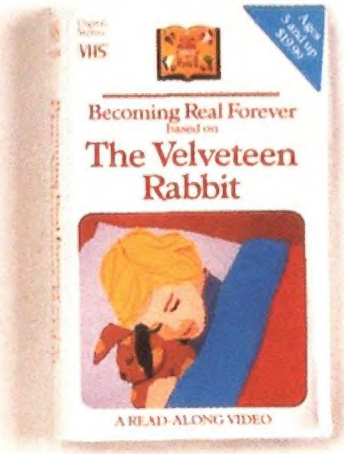


A collection of songs and stories on video about America's favorite stuffed animal. VHS & Beta.
VHS #8720 Beta #8725 $19.98



A colorful video rendition of Lear's classic poem with read-along words and phrases. VHS & Beta.
VHS #8722 Beta #8727 $19.98

The adventures of Peter Rabbit and friends on video using the latest in computer graphics. VHS & Beta.
VHS #8721 Beta #8726 $19.98



This childhood classic comes to life in full-color video animation. VHS & Beta.
VHS #8724 Beta #8728 $19.98

& More

Surprise someone close to you with our special gift certificates, complete with envelope and holder.

They're great for any occasion and perfect for those hard-to-please people on your list.

America finds it at

Waldenbooks®

Books • Audio • Video • Magazines • Software • Book Clubs • Special Services

For phone orders call: 1-800-543-1300 and ask for Operator 390. (Alaska and Hawaii: 1-800-545-1000, Operator 390.) Code # SD031

CLASSICS ON CASSETTES

BACH

331488-391482. Bach: Brandenberg Concertos, 1 to 6 (complete)—Kapp, Philharmonia Virtuosi of New York (Counts as 2—*Digital*—CBS Masterworks)

330530. Bach: Greatest Hits, Vol. 1—*Jesu, Joy Of Man's Desiring;* many more (CBS Masterworks)

330571. Bach: Greatest Hits, Vol. 2—*Sheep May Safely Graze; Brandenburg Concerto No. 2;* etc. (CBS Masterworks)

326983. Bach: Organ Masterpieces—*Toccata & Fugue In D Minor,* etc. A. Newman (Sine Qua Non)

171504. Switched-On-Bach—Moog versions of *Air on a G String;* more. Wendy Carlos (Columbia)

319434. Bach: Sonatas for Viola De Gamba & Harpsichord—Yo-Yo Ma, cello; Ken Cooper, harpsichord (*Digital*—CBS Masterworks)

316216. Bach's Suite No. 2 for Flute; Telemann: Flute Suite In A Minor—J. Baker, A. Newman, others (*Digital*—Vox Cum Laude)

331470-391474. Bach: Well-Tempered Clavier, Book 1—Anthony Newman, harpsichord (Counts as 2—*Digital*—Vox Cum Laude)

BEETHOVEN

273409. Beethoven: 3 Piano Sonatas—Moonlight, Appassionata, Pathetique. Horowitz, piano (Columbia)

325340. Beethoven: "Hammerklavier" Sonata; 11 Bagatelles—Rudolf Serkin (*Masterworks Portrait*)

332049. Beethoven: Piano Trios No. 4 & 5—Barenboim, Zukerman, DuPre (Vox Cum Laude)

330084. Beethoven: Overtures—Coriolan, Egmont, Fidelio, Lenore. Sir Georg Solti, Chicago Sym. (London Jubilee)

334342. Beethoven: Septet In E-Flat Major—performed by Boston Symph. Chamber Players (Nonesuch Silver Series)

332122. Beethoven: String Quartet In A Minor (Op. 132)—Fitzwilliam Quartet (*Digital*—London)

232496. Beethoven: Symphony No. 3 (Eroica)—Bernstein and New York Philharmonic (Columbia)

331108. Beethoven: Symphony No. 7—Tilson Thomas, English Chamber Orch. (CBS Masterworks)

252874. Beethoven: Symphony No. 9 (Choral)—Ormandy and the Philadelphia Orch. (Columbia)

325654-395657. Beethoven: Piano Concertos No. 1 & 5 (Emperor)—Brendel, piano (Counts as 2—Vox)

230425. Beethoven: Violin Concerto—Isaac Stern; Bernstein, New York Phil. (Columbia)

331991. Beethoven: Violin Sonatas No. 7 & 10—Zukerman, Barenboim (Vox Cum Laude)

BRAHMS

307884. Brahms: Double Concerto—Zukerman, violin; Harrell, cello; Mehta, N.Y. Phil. (Columbia)

334334. Brahms: Horn Trio (Op. 40); **Trio For Clarinet, Cello, Piano**—Boston Symphony Chamber Players (*Digital*—Nonesuch)

333757. Brahms: Serenade No. 1 In D—G. Schwarz, Los Angeles Chamber Orch. (*Digital*—Nonesuch)

330118. Brahms: String Quintets In F and G Major—Boston Sym. Chamber Players (*Digital*—Nonesuch)

328039. Brahms: Symphony No. 3; Haydn Variations—Mehta, New York Phil. (CBS Masterworks)

326280. Brahms: Violin Concerto—Isaac Stern; Ormandy, Philadelphia Orch. (CBS Great Performances)

329110. Brahms/Schoenberg: Piano Quartet—a masterful transcription! Comissiona, Baltimore Sym. (*Digital*—Vox Cum Laude)

DEBUSSY

330605. Debussy: Greatest Hits—*Clair de lune, Reverie,* etc. Bernstein, Ormandy, etc. (Columbia)

322826. Debussy: La Mer; Nocturnes—Michael Tilson Thomas, Philharmonia Orch. (*Digital*—CBS Masterworks)

328005. Debussy: Images (complete); **Estampes;** etc.—Ivan Moravec, pianist (*Digital*—Vox Cum Laude)

296830. Debussy: Quartet; Ravel: Quartet—Tokyo String Quartet (Columbia)

328401. Debussy: Sonata for Flute, Viola and Harp; Syrinx for Solo Flute—plus works by Ravel, Faure, etc. Orpheus Trio (*Digital*—Vanguard Audiophile)

HAYDN

326561. Haydn: 3 Favorite Concertos—Cello in D (Yo-Yo Ma); Violin in C (Cho-Liang Lin); Trumpet in E-Flat (Wynton Marsalis). (CBS Masterworks)

257956. Haydn: Symphony No. 101 (Clock), **No. 103** (Drum Roll)—Bernstein, N.Y. Phil. (Columbia)

332569. Haydn: Symphony No. 94 (Surprise), **No. 100** (Military)—Solti, London Phil. (*Digital*—London)

MOZART

332551. Mozart: Exultate, jubilate; Regina coeli; etc.—Emma Kirby, soprano; Christopher Hogwood, con. (*Digital*—L'Oiseau-lyre)

330688. Mozart: Piano Concertos No. 6 & 13—Murray Perahia, piano; English Chamber Orch. (*Digital*—CBS Masterworks)

294264. Mozart: Piano Concerto No. 21 (Elvira Madigan) and **No. 17**—Ashkenazy plays, conducts Philharmonia Or. (London)

326975. Mozart: Violin Concerto No. 4; Adagio; Rondos—Zukerman plays, conducts St. Paul Chamber Orch. (CBS Masterworks)

318311. Mozart: Symphonies 36 (Linz) **38** (Prague)—*Rampal, Mostly Mozart* Orch. (CBS Masterworks)

325365. Mozart: Eine Kleine Nachtmusik; Symphony No. 40—Casals, Marlboro Festival Orch. (Masterworks Portrait)

313007-393009. Mozart: Violin Concertos 3, 4, 5; Sinfonia Concertante—Isaac Stern, etc. (Counts as 2—CBS Masterworks)

SCHUBERT

322487. Schubert: "Death and the Maiden"; "Quartettsatz"—Tokyo String Quartet (*Digital*—Vox Cum Laude)

325092. Schubert: Sonata in B Flat; etc.—Alicia de Larrocha (*Digital*—London)

321729. Schubert: The Impromptus, Op. 90 & 142—Murray Perahia, piano (*Digital*—CBS Masterworks)

317677. Schubert: Symphony No. 8 (Unfinished); **Rosamunde Overture and Ballet Music**—von Karajan, Berlin Philharmonic (Angel)

TCHAIKOVSKY

312777. Tchaikovsky: Capriccio Italien; Rimsky-Korsakoff: Capriccio Espagnol; etc.—Bernstein (CBS Great Performances)

308874. Tchaikovsky: Piano Concerto No. 1—Gavrilov; Kitaenko cond. Moscow Radio/TV Sym. Orch. (Col/Melodiya)

329169. Tchaikovsky: Symphony No. 4—Lorin Maazel, Cleveland Orch. (CBS Masterworks)

245399. Tchaikovsky: Symphony No. 6 (Pathetique)—Ormandy and Phila. Orch. (Columbia)

326249. Tchaikovsky: 1812 Overture; Marche Slav; Romeo & Juliet—Bernstein, New York Philharmonic (CBS Great Performances)

293191. Tchaikovsky: Violin Concerto; Meditation—Stern; Rostropovich, National Sym. (Columbia)

231563. Tchaikovsky: Swan Lake and **Sleeping Beauty Ballet Suites**—Ormandy, Philadelphia Orchestra (Columbia)

304352-394353. Tchaikovsky: The Nutcracker (complete)—Andrew Davis, *Toronto Symphony Orch.* (Counts as 2—Columbia)

330555. Tchaikovsky: Greatest Hits—*Waltz Of The Flowers; 1812 Overture;* more. Bernstein, N.Y. Phil.; Ormandy, Phila. (Columbia)

BAROQUE

323543. Handel: Royal Fireworks Music; Oboe Concertos 1-3—Karl Munchinger, Stuttgart Chamber Orch. (*Digital*—London)

329615. Handel: Water Music. Malgorie, La Grande Ecurie & la Chambre duRoy (*Digital*—CBS Masterworks)

326595. Music For The Kings of France—harpsichord suites by Marchand and Couperin. Igor Kipnis (Nonesuch Silver Series)

316406. Pachelbel Canon & Other Baroque Favorites—also Bach's *Jesu, Joy Of Man's Desiring;* etc. Boyd Neel, Toronto Chamber Orch. (*Digital*—MMG)

331462. Purcell: Music For The Theater—*King Arthur; Fairy Queen;* more suites. McIntosh, City of London Chamber Orch. (*Digital*—Vox Cum Laude)

324525. An Isaac Stern Vivaldi Gala: Concertos For 2 and 3 Violins; etc. Stern, Zukerman, Perlman, etc. (CBS Masterworks)

319004. Glass, Philip: The Photographer—A modern classic (CBS)

201665. Grofe: Grand Canyon Suite—Ormandy, Phila. Orch. (Columbia)

326272. Holst: The Planets—Bernstein, New York Phil. (CBS Great Performances)

330126. Kodaly: Hary Janos Suite; Alfven: Swedish Rhapsody—Comissiona, Baltimore Symphony (*Digital*—Vox Cum Laude)

318246. Orff: Carmina Burana—Muti, Philharmonia Orch. & Chorus (Angel)

332130. Bruckner: Symphony No. 4—Walter, Columbia Symphony Orc (Masterworks Portrait)

333518. Bruckner: Symphony No. 7—Chailly, RSO Berlin (*Digital*—London)

333856. Chopin: Greates Hits—*Grande Valse Brillante, Military Polonaise, Minute Waltz,* etc. Variou artists (CBS Masterworks)

306183. Chopin: Piano Concerto No. 1—Murray Perahia; Zubin Mehta an New York Philharmonic (Columbia)

MODERN

329714. Bartok: Concerto for Orchestra; Dance Suite—Solti conducts Chicago Sym. (*Digital*—London)

325316. Bartok: Violin Concerto No. 2; Rhapsodies 1-2—Isaac Stern; Bernstein, New York Phil. (Masterworks Portrait)

325274. Berg: Lulu Suite—also works by Webern and Schoenberg. Philadelphia Orch., Ormandy (Masterworks Portrait)

263293. Bolling: Suite For Flute and Jazz Piano—Rampal and Bolling (Columbia)

324780. Bolling: Suite for Cello and Jazz Piano—Yo-Yo Ma, Bolling (CBS)

309500. Copland: "Billy The Kid" (Ballet Suite); **Four Dance Episodes from "Rodeo"**—Bernstein cond. (CBS Great Performances)

326439. Copland: Rodeo; Dance Symphony; El Salon Mexico; Fanfare for Common Man—Dorati, Detroit Sym. (*Digital*—London)

240473. Copland: Appalachian Spring (complete)—Copland and London Symphony (Columbia)

329060. Falla: Nights In The Gardens Of Spain; Three-Cornered Hat (Suite No. 2); etc.—Osorio, piano; de la Fuente, Xalapa Sym. (*Digital*—Vox Cum Laude)

326256. Ives: Symphony No. 3; Decoration Day; etc.—Bernstein, N.Y. Phil. (Masterworks Portrait)

318691. Prokofiev: Love For Three Oranges Suite; Lt. Kije Suite—Thomas, L.A. Phil. (CBS Masterworks)

318451. Ravel: Bolero; Pavane; Daphnis Et Chloe (Suite No. 2)—Andre Previn, London Symphony (Angel)

331447. Ravel: Ma Mere L'Oye (Mother Goose); **Le Tombeau De Couperin;** etc.—Dutoit, Montreal Sym. (*Digital*—London)

324533. Respighi: Feste Romane; Pines & Fountains Of Rome—Dutoit, Orch. de Montreal (*Digital*—London)

326223. Schoenberg: Pelleas & Melisande—Daniel Barenboim and Orchestre de Paris (CBS Masterworks)

324046. Shostakovich: Cello Concerto No. 1; Kabalevsky: Cello Conc. No. 1—Yo-Yo Ma, cello; Ormandy, Phila. Orch. (*Digital*—CBS Masterworks)

333450. Shostakovich: Symphony No. 8—Haitink, Amsterdam Concertgebouw (*Digital*—London)

326405. Stravinsky: The Firebird (complete ballet)—Dohnanyi; Vienna Phil. (*Digital*—London)

281493. Stravinsky: Rite Of Spring—Zubin Mehta, N.Y. Phil. (Columbia)

ROMANTICS

325282. Bruch: Violin Concerto; Lalo: Symphonie Espagnole—Francescatti; Mitropoulos, Schippers, New York Philharmonic (Masterworks Portrait)

326454. Dvorak: Cello C certo; Bruch: Kol Nidrei Harrell, cello; Ashkenaz cond. (*Digital*—London)

333526-393520. Dvorak Slavonic Dances (Op. 72); **American Suite**—Dorati, Royal Phil. (Cour as 2—*Digital*—London)

325183. Dvorak: Symphony No. 9 (New Worl —Solti, Chicago Symph Orch. (*Digital*—London)

331090. Franck: Great Organ Works—3 Chora others. Peter Hurford, organ (*Digital*—Argo)

228684. Grieg: Peer Gy Suites 1 and 2; Bizet: Carmen Suites—Leona Bernstein and the New York Phil. (Columbia)

325381. Grieg: Piano C certo; Schumann: Pian Concerto—Leon Fleish Szell, Cleveland Orch. (Masterworks Portrait)

321208. Liszt: Hungaria Rhapsodies 2,3,5; Mep isto Waltz—Willi Boskov London Phil. (Angel)

314369. Mahler: Symphony No. 1 (Titan Maazel, Orch. Nat'l de France (CBS Masterwo

317685. Mahler: Symph No. 4—Ameling; Previn Pittsburgh Sym. (Angel

325357. Mahler: Das Li von der Erde—soloists, New York Philharmonic under Bruno Walter (Masterworks Portrait)

305730. Mendelssohn: Symphony No. 4 (Italia **Overtures**—Andre Prev London Symphony (An

32056. Mendelssohn: Midsummer Night's Dream; etc. Zinman, Rochester Philharmonic (*Digital*—Vox Cum Laude)

30698. Offenbach: Gaite Parisienne; Saint-Saens: Danse Macabre; etc.—Maazel, Orch. National de France (Columbia)

30589. Rachmaninoff: Greatest Hits—*Vocalise;* etc. (CBS Masterworks)

45043. Rachmaninoff: Piano Concertos No. 1 & 2—Ashkenazy; Previn, London Sym. (London)

314260. Salieri: Sinfonia Veneziana; more—Pesko and London Symphony (CBS Masterworks)

234237. Schumann: Piano Concerto; Mendelssohn: Piano Concerto No. 1—Rudolf Serkin; Ormandy, Phila. Orch. (Columbia)

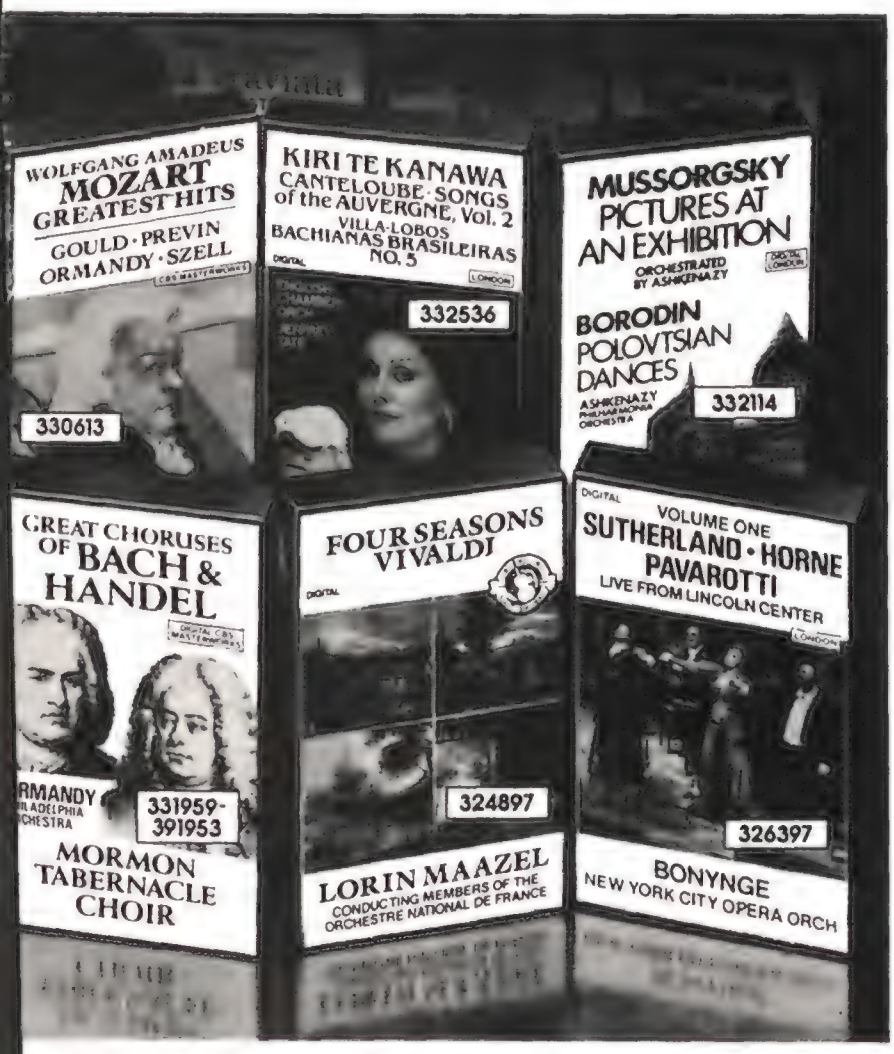
225888. Smetana: Moldau, Bartered Bride Overture, Dances; etc. Bernstein, N.Y. Phil. (Columbia)

310870-390872. Johann Strauss' Greatest Waltzes Ormandy, Szell, Bernstein (Count as 2—Columbia)

321844-391847. Verdi: La Traviata—Original Motion Picture Soundtrack. Starring Placido Domingo and Teresa Stratas (Counts as 2—Elektra)

310086. Wagner: Overtures *Flying Dutchman, Rienzi,* etc. Maazel, Philharmonia Orch. (Columbia)

330654. Weber: Music For Wind Ensemble—*6 Waltzes; Concertino for Oboe & Winds;* etc. Jean-Claude Malgoire conducts this "Music For A Sunday Afternoon" (CBS Masterworks)



334714-394718. Glenn Gould—Bach, Vol. 2. *French Suites (Nos. 1-6); Overture In The French Style* (Counts as 2-CBS Masterworks)

246843. Horowitz Plays Chopin—Mazurkas, Etudes, many more (Columbia)

327007. Patrick Gleeson's Computer Realization of Vivaldi's Four Seasons (*Digital*–Varese Sarabande)

328112. Lili Kraus Plays Bartok—*Hungarian Peasant Songs & Folksongs; Rondos; Sonatina;* etc. (Vanguard)

331306. Katia & Marielle Labeque—Gladrags. Piano duo team performs works by Scott Joplin, James P. Johnson, Gershwin & Donaldson, etc. (Angel)

313767. Ruth Laredo Plays Ravel—*La Valse, Miroirs,* etc. (CBS Masterworks)

326603. Ivan Moravec plays **Schumann & Brahms.** *Kinderszenen; Intermezzi;* more (*Digital*—Nonesuch)

331371. Christopher Parkening & The Guitar. Handel, Couperin, Satie, Scarlatti, more (Angel)

280610. Jean-Pierre Rampal Greatest Hits—Debussy's *Girl With The Flaxen Hair;* Handel's *Largo;* etc. (Columbia)

319582. Jean-Pierre Rampal Plays Scott Joplin. *The Entertainer,* etc. (CBS)

332502. Andre-Michel Schub Plays Schubert's "Wanderer" Fantasy—also fantasies by Chopin and Mendelssohn (*Digital*—Vox Cum Laude)

331132. Andres Segovia—Espana. Works by Granados, Albeniz, Rodrigo, etc. (MCA)

331116. Andres Segovia plays works by Bach, Sor, Villa-Lobos, more (MCA)

311647. Isaac Stern 60th Anniversary Celebration. With Zukerman, Perlman, Mehta, etc. (Columbia)

331439. Isaac Stern and Alexander Zakin. Enesco: Violin Sonata No. 3; also works by Dvorak, etc. (CBS Masterworks)

309237. Daniel Varsano—Erik Satie Piano Music. *Gymnopedies, Sonatine Bureaucratique,* many others (Columbia)

319848. Andre Watts—Live In Tokyo. Works by Ravel, Brahms, Debussy, Haydn, etc. (*Digital*—CBS Masterworks)

320895. Portrait of John Williams—*Theme from "The Deerhunter"; Fool On The Hill;* etc. (CBS Masterworks)

VOCAL AND ORCHESTRAL COLLECTIONS

308890-398891. Bernstein Conducts World's Greatest Marches. Washington Post, more (Counts as 2—Columbia)

334490. Calliope Festival—An Italian Renaissance Revel. Joyous music from the 13th to 16th century! (*Digital*—Nonesuch)

292003-392001. Curtain Raisers—World's Favorite Overtures. *Die Fledermaus, Carmen; William Tell;* etc. Bernstein, Ormandy, etc. (Counts as 2—Columbia)

329524. Peaches & Cream—Dances & Marches by John Philip Sousa. Erich Kunzel, Cincinnati Pops (*Digital*—Vox Cum Laude)

328856. Placido Domingo—Always In My Heart. Spanish songs by Lecuona; *Malaguena,* more (CBS)

317651. Placido Domingo—arias from *Aida, Faust, Don Carlo;* etc. (Angel)

326553. Placido Domingo—Great Love Scenes. Kiri Te Kanawa, Ileana Cotrubas, Renata Scotto (CBS Masterworks)

331363. Arthur Fiedler's Favorite Overtures—by Shostakovich, Goldmark, Sullivan, Copland. With Boston Pops (Polydor)

322347. Marilyn Horne—Live At La Scala. Music by Granados, Handel, Stephen Foster, Copland, more (CBS Masterworks)

332494. Erich Kunzel and Cincinnati Pops—International Salute. Music by Sibelius, Tchaikovsky, etc. (*Digital*—Vox Cum Laude)

327551. Luciano Pavarotti—Mamma. Popular Italian songs arranged by Henry Mancini (*Digital*—London)

303453-393454. Pavarotti's Greatest Hits. 26 favorites by Verdi, Puccini, Bizet, Donizetti, Bellini, etc. (Counts as 2—London)

326421. Leontyne Price Sings Verdi—arias from *Aida, Otello, Ernani,* etc. Mehta, cond. (London)

321463. Beverly Sills and Andre Kostelanetz—Music of Victor Herbert. *Ah, Sweet Mystery of Life;* etc. (Angel)

320887. Kiri Te Kanawa—Verdi and Puccini Arias. Pritchard, London Phil. (*Digital*—CBS Masterworks)

324772. Kiri Te Kanawa—Songs of the Auvergne, Vol. 1—Canteloube's songs (*Digital*—London)

329722. Wagner: Lohengrin (Highlights)—Peter Hofmann, Tenor; Bayreuth Festival Orch. & Chorus (CBS Masterworks)

329136. Waverly Consort—Sephardic Songs; songs by Gombert, de Victoria, etc. (CBS Masterworks)

436. Rimsky-Korsakov: Scheherazade—Yevgeny Svetlanov and the London Symphony Orch. (Angel)

100. Saint-Saens: Carnival of the Animals plus works by Debussy, etc. Philip Jones Brass Ensemble (*Digital*–London)

382. Saint-Saens: Symphony No. 3 (Organ)—Lemieux; Dutoit, Montreal Symphony (*Digital*—London)

320424. Richard Strauss: Ein Heldenleben—Dicterow, violin; Mehta and NY. Phil. (*Digital*—CBS Masterworks)

202796. Richard Strauss: Also Sprach Zarathustra—Bernstein, New York Philharmonic (Columbia)

326447. Verdi: Overtures—*La Forza del Destino, I Vespri Siciliana, Nabucco,* etc. Chailly, National Philharmonic (*Digital*—London)

VIRTUOSO!

331140. Jorge Bolet Plays Liszt—Annees de Pelerinage (Suisse). Thrilling score (*Digital*—London)

325886. Liona Boyd—Live In Tokyo. Works by Dowland, Soler, Falla, etc. (*Digital*—CBS Masterworks)

305714. Canadian Brass—Royal Fanfare. Bach, Des Prez, etc. (Vanguard)

ANY 11 FOR $1.00

plus shipping and handling

if you join the Club now and agree to buy 8 more selections (at regular Club prices) during the coming 3 years

re's a wonderful opportunity to start or add to your collection of the world's eatest music —on easy-to-play, carefree cassettes! As a new member of the lumbia Classical Club, you get any 11 cassettes for only $1.00, plus shipping d handling. *(Or take 11 selections on stereo records.)* In exchange, you agree buy just 8 more selections in the next three years, at regular Club prices (which rrently are $7.98 to $9.98, plus shipping and handling; multi-unit sets and some gital recordings may be somewhat higher.)

w the Club works: every four weeks (13 times a year) you'll receive our Music agazine. It describes the "Classical Selection of the Month" *plus* scores of ssical releases, as well as selections from other fields of music. In addition, up six times a year you may receive offers of Special Selections, usually at a count off regular Club prices, for a total of up to 19 buying opportunities.

re is no obligation to accept the "Selection of the Month"—you order *only* the ordings you want *when you want them!* A special response card will be closed with each Magazine—mail it by the date specified to order or reject selection. And if you want *only* the "Selection of the Month", do nothing—it be shipped automatically. You'll have at least ten days in which to make your cision—if you ever have less time than that, just return the Selection at our pense. And you may cancel membership anytime after buying 8 selections, or ntinue under our money-saving bonus plan.

Day Free Trial: we'll send details of the Club's operation with your introductory pment. If you are not satisfied for any reason, return everything within 10 ys—your membership will be canceled and you will owe nothing.

ecial Start-Your-Membership-Now Offer: you may *also* choose your first ection now—and we'll send it to you for at least 60% off regular Club prices y $2.99). This discount purchase reduces your membership obligation imme-ely—you then need buy just 7 more (instead of 8) in 3 years. Just check box in plication and fill in the number of your first selection.

pplications subject to review; Columbia House reserves the right to reject any application.

selections with two numbers are 2-record sets or double-length tapes. Each of these ble selections" counts as 2—so write in both numbers.

© 1985 Columbia House

COLUMBIA CLASSICAL CLUB
Columbia House, Terre Haute, IN 47811

Please accept my membership application under the terms outlined in this advertisement. Send me the 11 classical selections listed here for only $1.00, plus shipping and handling. I agree to buy eight more selections (at regular Club prices) in the coming three years—and may cancel membership at any time after doing so.

Send my selections in this type of recording (check one):
☐ TAPE CASSETTES ☐ STEREO RECORDS

☐Mr.
☐Mrs. _____
☐Miss *Print First Name* *Initial* *Last Name*

Address _____ Apt. _____

City _____

State _____ Zip _____

Do you have a telephone? (check one) ☐Yes ☐No 209/F85
Do you have a credit card? (check one) ☐Yes ☐No

☐ Also send my first selection for at least a 60% discount for which I will be billed an additional $2.99. I then need buy only 7 more (instead of 8) at regular Club prices, in the coming 3 years.

This offer is not available in APO, FPO, Alaska, Hawaii, Puerto Rico. please write for details of alternative offer

SEND ME THESE 11 SELECTIONS

☑CLASSICAL

7H1/ME 7H2/MD

Smithsonian horizons

Our collections may include some trivia, but the real emphasis is on more enduring achievements

"Smithsonian treasures TV trivia" was the headline on a story in the *Chicago Tribune* last spring. Amid traces of skepticism about whether these are indeed "national treasures," critic Marilynn Preston noted the recognition and pleasure with which exhibits like Mister Rogers' sweater, J.R.'s hat, Fonzie's leather jacket and Archie Bunker's chair are greeted by throngs of Smithsonian visitors. In the course of interviewing curator Carl Scheele, who has the responsibility for these and similar acquisitions in the National Museum of American History's Division of Community Life, it appears that her doubts were largely dispelled by what she saw and heard. So have been those of other commentators.

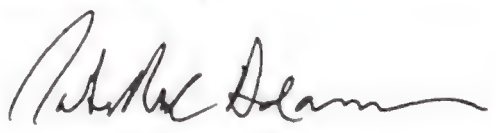
Television is central to how we see who we are and how we got that way, Scheele told her. It is perhaps the most intimate theater ever created, permitting the sharing of experiences, values and dreams by immense numbers of Americans. For all its popularity, the Museum's TV trivia collection is small and selective and is being allowed to grow only slowly. "We're not a Hall of Fame," Scheele continued, although it clearly helps for a program to reach a mass audience. Evident behind most of the selections that have been made is a sensitivity in the parent programs to issues that are foremost in our modern American consciousness. Also evident in most of the shows thus memorialized is the depth and complexity of the central characters, which may help to explain their durability.

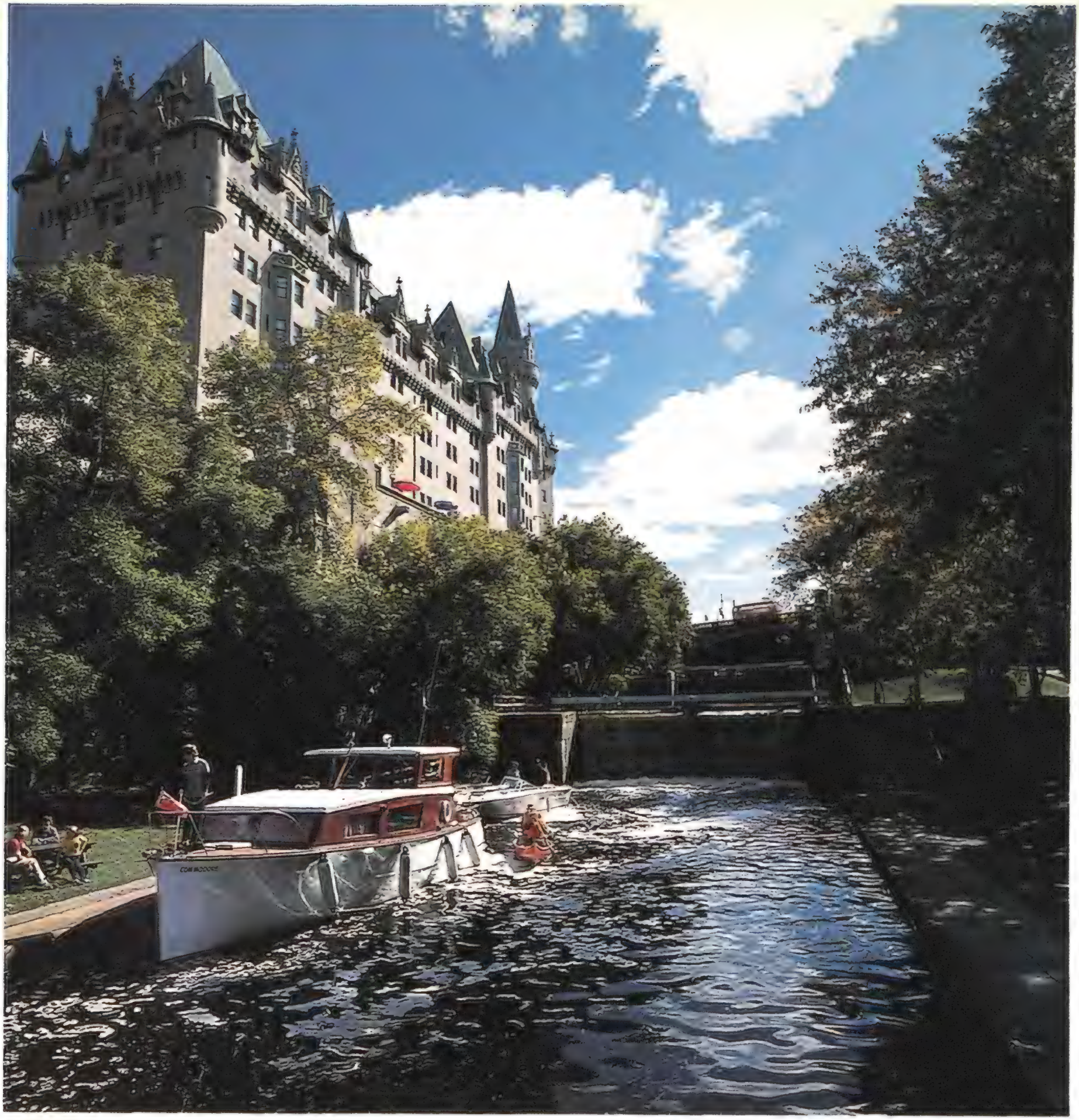
There is undoubted substance in this rationale, but I must confess that it still leaves me uneasy. A treasure, I would like to think, is something of enduring value. It should be chosen for placement in a museum not because it is instantly recognizable, but because it will continue to evoke rich images and associations when no one is left who recognizes it. Or a second criterion might be that objects acquired for museums will at least retain permanent value as signposts of their times, guiding viewers into a deeper understanding of past and present circumstances. TV itself probably has become the most evocative, widely observed signpost we have. But can we explain its power with a few isolated accessories or pieces of clothing?

It ought not to be the practice of a Smithsonian Secretary, and it will not be of this one, to attempt to call the shots on collecting policy outside a very narrow realm of personal expertise. I concede that I have none in this area. Even if the connection with our mandate for the "increase and diffusion of knowledge" is as debatable as I am implying, would I really want to argue with those crowds of appreciative viewers? Definitely not. The Smithsonian has a responsibility to all of its many audiences, including those for whom some tangible vestige of familiar TV imagery is clearly a pleasurable part of a trip to Washington. Other than in the disproportionate attention given to these items by the media, the Smithsonian's collection is—and will remain—very small. So why is the whole matter still somewhat troubling?

My formal responsibilities may begin with the rationale for the Smithsonian's collecting activity, but the underlying issue involves a feature of American thought and perception that is disturbingly more general. The boundary between performance and actuality, between the false simplicity of media hype and the contextual considerations and uncertainties with which we must inevitably deal, is becoming dangerously blurred.

Perhaps the most important truths are simple ones. But our own human record of creativity (and destructiveness) certainly seems memorable enough to deserve the primary attention of the museumgoing public, without needing the airbrush treatment of media-based myth and metaphor. Most people, I believe, come to the Smithsonian and other museums as places to view treasured achievements that are tangible as well as enduring. But if the relics of TV are accepted as additions to the permanent collections of museums, with accompanying fanfare, is there not some danger that we will contribute to the ongoing erosion of vital standards of judgment and performance in the society at large?





Ottawa, Ontario/Canada

Room with a view

It's called a château and looks like a castle, but it's actually a hotel and please be our guest. Canada's capital abounds with far-away feelings from double-decker bus tours and sedate canal cruises to Changing the Guard on Parliament Hill. The splendours of our heritage are yours to discover in Ottawa, Ontario/Canada. Treat yourself royally! Ask about the 7% sales tax rebate, 5% room tax rebate and the advantageous exchange on American currency, up to 35%.* Call TOLL FREE 1-800-268-3735 or write: Ontario Travel, Queen's Park, Toronto M7A 2E5, Ontario/Canada.

**Subject to change*

ONTARIO
yours
to discover!

No. 3

The Hay-Adams Chronicles

(Authentic examples of the standard of service at the Hay-Adams Hotel.)

A first-time guest charged out of the elevator, headed for the front door. His peripheral vision caught a glimmer of the yellow *moire* walls of the Henry Adams Room, which has become breakfast meeting place of choice for official Washington. "How lovely!" he exclaimed, "I wish I had time for breakfast." Andrew, one of our people, overheard the remark, and by the time the guest had checked out he'd delivered a glass of fresh-squeezed orange juice. Was that difficult to do? Andrew would have found it difficult not to have done it.

The Hay-Adams. A hotel with the grace of a fine home. Across from the White House at One Lafayette Square, Washington, D.C., (202) 638-6600, (800) 424-5054.

The Hay-Adams Hotel

Letters to the Editor

Bronx High School of Science

Dear Sir: As far as Science High is concerned, I went into military service two days after I was 18. I came home an old man four years later. The education I received at Science gave me so many college equivalency credits that I was able to get a college degree within a year and a half. God bless that school.

S. A. Goldstein
San Francisco

Christmas shopping at the Museum is different . . .

Whether it's a Byzantine gold and amethyst necklace, a new book on Matisse, a silk scarf with a Chinese owl, a Tiffany poster, or a medieval unicorn, the Museum has the ideal present for everyone on your Christmas list. A splendid new collection ranging from ancient Egyptian bronze cats to Indian paisley silk ties, from brilliantly colored early American glass to silver boxes from the Renaissance, plus a special selection of distinctive Museum Christmas cards and boxed note cards.

ACG5

The more than seven hundred presents are made exclusively for the Museum and are priced from $5 to more than $500, with a wide choice between $10 and $50. To receive the 132-page Christmas catalogue, send coupon with $1 to cover mailing.

Name _____

Address _____

City _____

State _____ Zip _____

THE METROPOLITAN MUSEUM OF ART

255 Gracie Station, New York, N.Y. 10028

Dear Sir: Your article astounded this graduate of BHSS. I remember a different place, a school where high grades were pursued with almost cultlike fanaticism, where short-term, pretest retention (not to mention rampant cheating) got better rewards than true, trial-and-error learning; where the normal needs of growing adolescents were neglected in favor of accelerated programs and crushing course loads that looked good to visiting educators.

The code name for anyone unable—or unwilling—to flourish in this high-pressure environment was "underachiever." Can any of us really ever claim to be living up to his potential?

I would as soon send a child of mine into a West Virginia coal mine as enroll him or her at my alma mater.

Andy Meisler, '69
Los Angeles

Dear Sir: I was glad to learn that my alma mater is still teaching the way it did 35 years ago, utilizing the mind as a tool, teaching one to think, not just memorize.

Nobel Prize winners Sheldon Glashow and Steven Weinberg were members of

A powerful new work created in the rich tradition of bronze horse sculpture.

An original sculpture dramatically revealing Monroe's love and knowledge of horses.

Horses have always been a very special part of Lanford Monroe's life. There has never been a time when she hasn't owned or worked with them. And, as an experienced equestrian, she has the most profound understanding of their inner spirit as well as their physical beauty. It's no wonder, then, that her enormous artistic talent finds its finest expression in the extraordinary bronze sculptures she creates portraying these magnificent creatures.

Now, The Franklin Gallery takes pleasure in announcing "The Intruder," a compelling new work by Lanford Monroe—one that confirms her dominance among the great horse artists of our day.

In this original sculpture, a stallion and his mare—their peaceful browsing shaken by an unfamiliar sound or scent—stand alert. It is a moment of high drama and primal impact, when natural curiosity is tenuously balanced by the instinct for survival. The scene is portrayed with complete and stunning realism—the quality most highly valued by knowledgeable collectors of bronze horse sculpture.

To capture every detail of the artist's work, "The Intruder" will be crafted in cold-cast bronze. Each piece will be *individually* shaped from a carefully prepared sculptor's blend of powdered bronze and resins, then meticulously *hand-finished* to achieve the lustrous patina that is characteristic of the finest bronzes.

This important new sculpture is available only by direct application from The Franklin Gallery. And there is a limit of one per order.

Displayed in the home, this vibrantly life-like work will be enjoyed, admired—and talked about—by all who see it. A superb example of horse sculpture at its exciting best.

You need send no payment now, to acquire "The Intruder." Simply return the accompanying Order Form to The Franklin Gallery, Franklin Center, PA 19091, by July 31, 1985.

The Franklin Gallery
A FRANKLIN MINT COMPANY

hown smaller than actual size of pproximately 8" high × 11½" wide ncluding base).

© 1985 FG

ORDER FORM

THE INTRUDER *by Lanford Monroe*

The Franklin Gallery
Franklin Center, Pennsylvania 19091

Please mail by July 31, 1985.
Limit: One per order.

Please accept my order for "The Intruder," an original sculpture by Lanford Monroe, to be crafted for me in cold-cast bronze and hand-finished, at the issue price of $195.*

I need send no money now. When my sculpture is ready to be sent to me, I will be billed for a deposit of $39.* and, after shipment, for the balance in 4 monthly installments of the same amount.

**Plus my state sales tax and $2.50 for shipping and handling.*

Signature _____
ALL ORDERS ARE SUBJECT TO ACCEPTANCE

Mr./Mrs./Miss _____
PLEASE PRINT CLEARLY

Address _____

City _____

State, Zip _____

the graduating class of June 1950, which produced more than 70 doctors, at least one judge, a New York City councilman, numerous attorneys, a plethora of professors and the usual crop of scientists. At a time when less than 50 percent of high school graduates were going to college, more than 99 percent of our class went on to obtain at least one college degree.

The decision not to have a football team was made in 1948, not by faculty or principal but by a ballot vote of the entire student body. Our reasons were threefold: the cost of equipment would have taken away funds earmarked for other extracurricular activities, the time demands were too great, and we had no practice or playing field.

Larry Jason
Silver Spring, Maryland

Dear Sir: University High School in Urbana, Illinois, also counts among its graduates three Nobel Prize winners: Philip W. Anderson in physics, 1977; Hamilton O. Smith in medicine, 1978; James Tobin in economics, 1981. George F. Will won a Pulitzer in 1977 for commentary; in addition, we have a former Postmaster General, a litany of federal judges, successful playwrights, high-ranking military officers, and so on.

With 35-45 graduates a year and a student body numbering around 225 annually, Uni High has graduated in the neighborhood of 2,500 in its nearly 70-year history—fewer than BHSS has students each year. Of our students, 98 percent go on to colleges and universities.

There is a great deal of talk about excellence in education these days, some of it sensible, much of it fatuous. I do not believe we will make real progress until we take seriously the idea that education is a whole community enterprise. However good schools may be or become, they do not produce educated individuals until families and communities hold a commonality of viewpoint about what education amounts to, about its importance, and the view that everybody is in it together.

Warren L. Royer, Principal
University High School
Urbana, Illinois

Dear Sir: As father and son graduates of BHSS, it is inconceivable to us that a story on the school could be written without mentioning its founding genius and first principal, Dr. Morris Meister.

Shaurain Farber
Reuben E. Farber
Bronx

Marc Chagall

Dear Sir: The stained-glass windows in the hospital synagogue in Jerusalem, mentioned by Mr. Wernick, are in the Hadassah complex. Hadassah, an American women's Zionist organization that operates the two hospitals we have built in Jerusalem, is very proud that we gave Chagall this early commission in Israel.

Ruth Siegel
Lake Worth, Florida

Dear Sir: Marc Chagall refused to return to Vitebsk, fearing he'd not recognize it. The city's transformation, however, cannot be attributed entirely to World War II and the intense fighting in the region.

In Chagall's youth the crowning glory of Vitebsk was the cathedral. As described in Gen. Petro G. Grigorenko's *Memoirs*, "This miracle of architecture stood on the right bank of the Western Dvina River, all five of its cupolas facing the river. People on ships saw it from afar, as they passed the town and . . . made the sign of the cross and prayed. . . . The authorities were irritated by such daily public worship, so our battalion received an order from the chief of engineers of the Byelorussian Military District to destroy the cathedral."

General Grigorenko, in 1934 a young engineering officer, took charge and successfully destroyed Vitebsk Cathedral with explosives—so neatly that he was then ordered to demolish churches in Minsk and Smolensk, other White Russian cities. In his words, "I consciously participated in one of the most flagrant instances of barbarism of our age—the destruction of the most important historical monuments of the Byelorussian and Russian peoples, their churches."

Franklin G. Babbitt
Oakton, Virginia

Sandia Labs

Dear Sir: As a structural engineer, I would like to point out that rocketing a truck into a wall of cement would probably not produce the results shown in the photos accompanying your article. However, rocketing it into a wall of concrete will definitely produce those effects. Cement is nothing more than an extremely fine powder which, when mixed with water and aggregate, produces concrete. The hard substance we encounter in our daily lives is concrete.

Dennis B. Halpin
Houston

Reader Halpin has caught us with our powder dry. Ed.

Herbert Hoover

Dear Sir: Author John Garrity failed to mention the crowning jewel in Mr. Hoover's humanitarian accomplishments. It was the magnificently successful effort of the American Relief Administration, which he headed, in saving millions of lives during the terrible famine that swept Russia in 1921-23.

In an expression of sincere and deep gratitude, the Russian Bolshevik leaders, at a great banquet held in the Kremlin, presented Mr. Hoover with a beautiful and elaborate scroll expressing "deepest thanks" to Herbert Hoover and his ARA colleagues and declaring that the people of the USSR "will never forget the help given them by the American people, through the ARA, seeing in it a pledge of the future friendship of the two nations."

Mildred Sloane
Des Moines

Dear Sir: Because of my father's close association with Herbert Hoover, I remember him both in his White House days and in his later years in the Waldorf-Astoria Towers. I went to Army-Navy football games with him and sat on the players' bench as his "grandson." He was an occasional visitor to our home and attended my wedding.

It is very true that he exhibited two entirely different characters. In the 1920s he dressed severely even by standards then current, refusing to buy sports clothes, going deep-sea fishing dressed in an old blue-serge suit. To me, as a youngster, he seemed forbidding. It is the general impression in our family that much of his formality and severity was the result of the puritanical Lou Henry.

But a change began to come over Mr. Hoover around the time of World War II and his widowerhood. My more recent

From SAN DIEGO *to* ST. TROPEZ,

you'll find Visa just as accepted as it is around town. For Visa Cards and Travelers Cheques carry the name most widely used around the world for travel, shopping, entertaining and cash.

With Visa you're welcome at nearly four million locations, in 156 countries, on six continents. And you can get cash advances with Visa from over 151,000 bank offices worldwide.

All of which means that for personal or business use, few things in this world are as useful, convenient, versatile and accepted as Visa.

VISA

ALL YOU NEED.℠

©1985 Visa

You'd give her the world if you could.
She'd settle for just a piece of it.

DeBeers

The ring featured contains quality diamonds with a center stone of over one-half carat.

A diamond is forever.

Choose a diamond as valuable as the love you share.

An understanding of a diamond's qualities can add enormously to the value, beauty and pleasure of any diamond acquisition. And understanding quality in diamonds begins with the 4C's: Cut, color, clarity and carat-weight. It is the 4C characteristics that determine the value of a diamond.

If you're the kind of person who appreciates quality in every aspect of your life, from the wine you choose to the car you drive, you'll want to know more about quality in diamonds. Because diamonds of quality have more fire, more sparkle and scintillation. And they'll enhance your jewelry no matter what the design.

Your jeweler is the expert where diamonds are concerned. But your own understanding of diamond quality can help make your next diamond purchase even more special. So we've prepared a helpful brochure that takes only a few minutes to read. Not much, when you consider that a diamond is forever.

Your guide to diamond value. Consult your jeweler, or write for a copy of our informative brochure to Diamond Information Center, Dept. Q, 1345 Avenue of the Americas, N.Y. 10105.

memories of him in the postwar years were of a relatively relaxed and avuncular man who enjoyed the company of old friends and the chance to tell an amusing story, at which he was very skilled.
Lewis H. Strauss
Washington, D.C.

Dear Sir: During my work as docent for the Hoover Site at West Branch, Iowa, the ill-founded popular impression of Bert Hoover came to me thick and fast from some of the visitors. Though I was dedicated to presenting an accurate and positive report on Hoover's many-faceted contributions to humanity, the negative slurs were as abusive as they were vocal.

Thus it is good to have positive reinforcement regarding an early era of Hoover's contributions.
Robert E. Belding
Ocala, Florida

Dear Sir: May I add a footnote? In 1912 the Hoovers combined his interest in mining and her skills as a linguist, translating from the Latin Georgius Agricola's great 16th-century treatise on mining and metallurgy, *De re metallica*. The volume reproduces Agricola's woodcuts and they, with his text and the Hoovers' annotations, make it invaluable as a major source on late-Medieval mining technology and industrial technology generally. The book was reprinted in 1950 by Dover.
Don D. Fowler
Reno, Nevada

Royal Literary Fund

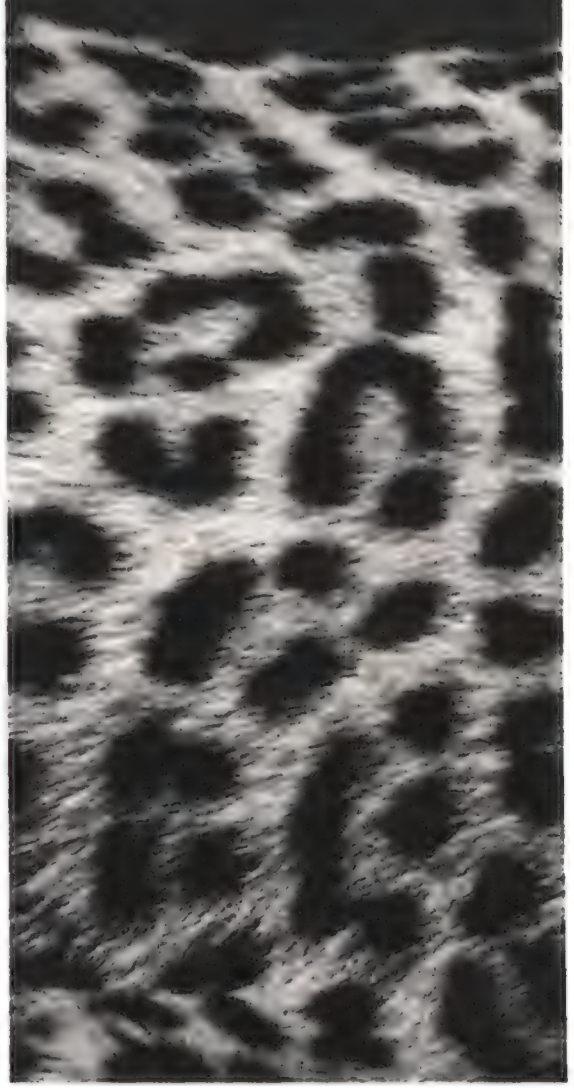
Dear Sir: I have lived by the dictum that writing, i.e., starvation, is its own reward. But I have also lived by the dictum that Man ought not live by Snickers bars and government cheese subsidies alone. I'm packing the word processor and catching the first log for England.
David Wenstrom
Redwood City, California

Mall

Dear Sir: In mentioning the *"Vlaiclu No. 1"* model, with all due respect, I believe you are talking about *Vlaicu No. 1* by Aurel Vlaicu, a well-known pioneer of early aviation in my native Romania.
George Mihail, M.D.
Forest Hills, New York
Dr. Mihail is correct. Ed.

"See more spots on our African safaris."

"Let KLM connect you to them."



Born Free Safaris can get you this close to the wildlife of Africa. We'll show you nature at its best with the best in guides, accommodations and places to visit. And the one airline that connects you to them all is KLM—the airline voted best in passenger service. Mail the coupon. Then call your travel agent.

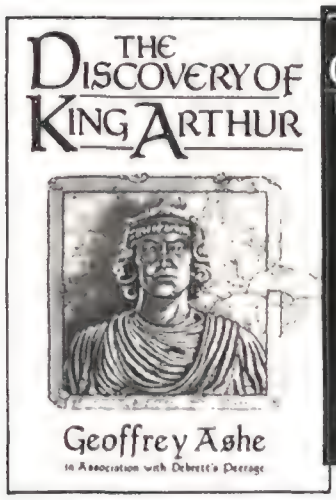
BORN FREE SAFARIS SB75
12504 Riverside Drive,
North Hollywood, CA 91607
1-800-3-SAFARI Toll Free
1-800-4-SAFARI California

Send me your comprehensive 28-page BORN FREE SAFARIS Brochure

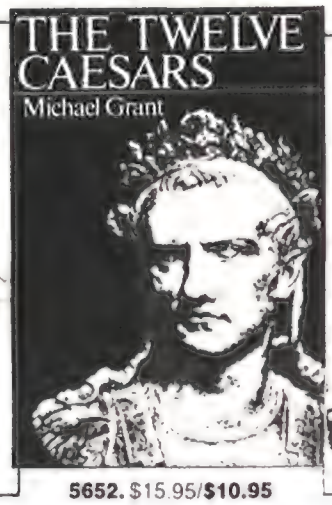
Name _____
Address _____
City _____
State _____ Zip _____

The Reliable Airline. KLM Royal Dutch Airlines

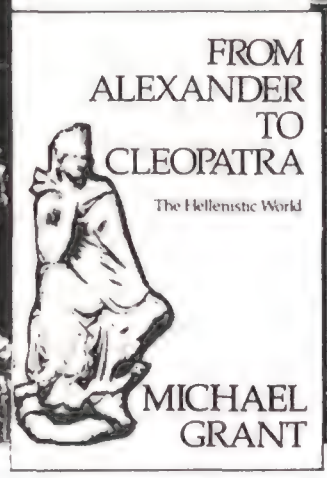
SAVINGS THAT GO DOWN IN HISTORY



1339. $18.95/**$14.95**



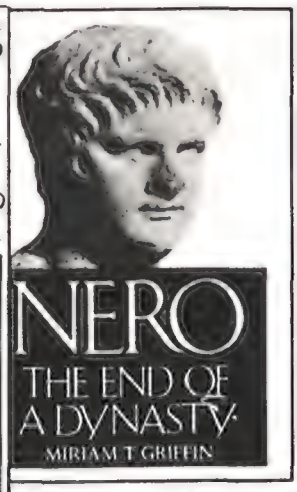
5652. $15.95/**$10.95**



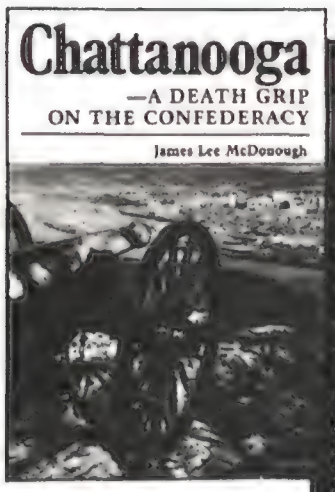
5736. $19.95/**$13.95**

5504. $25.00/**$13.00**

1859. $15.00/**$10.50**

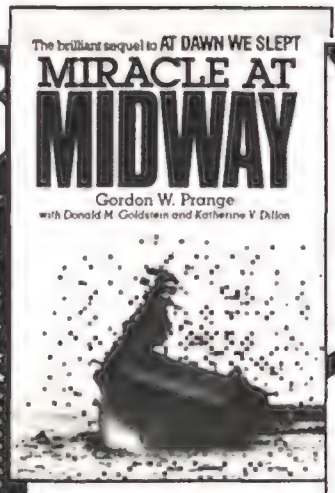


2030. $25.00/**$17.00**

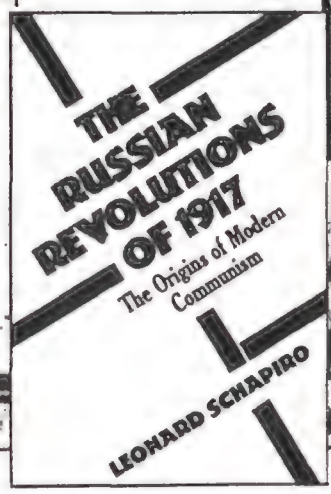


8995. $19.95/**$14.95**

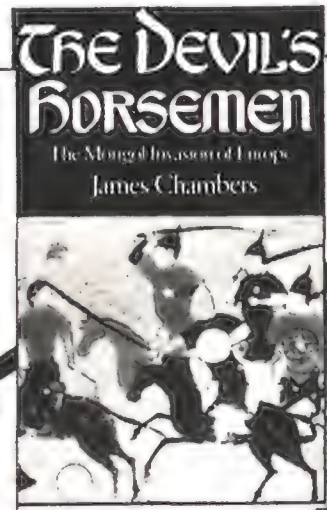
2139. $20.00/**$15.50**


The brilliant sequel to AT DAWN WE SLEPT
MIRACLE AT MIDWAY
Gordon W. Prange
with Donald M. Goldstein and Katherine V. Dillon

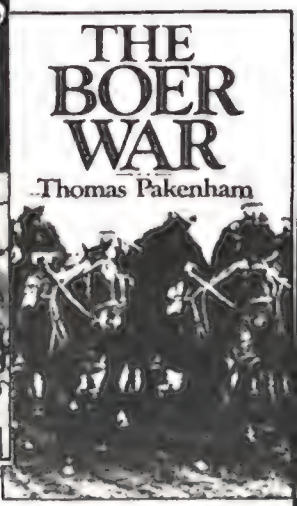
6718. $19.95/**$13.95**



1479. $19.95/**$13.95**

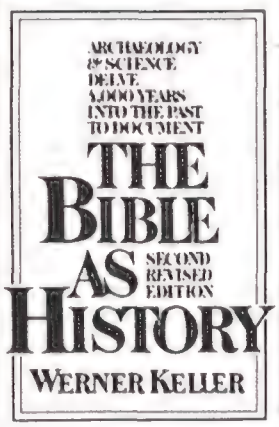


8284. $11.95/**$8.95**

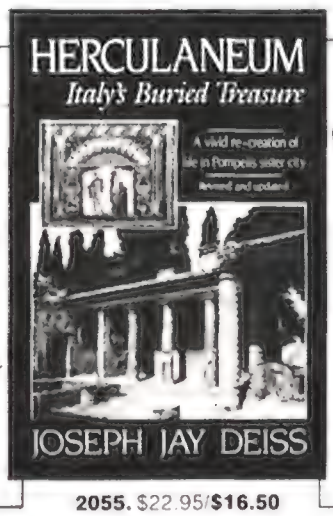


8466. $20.00/**$12.50**

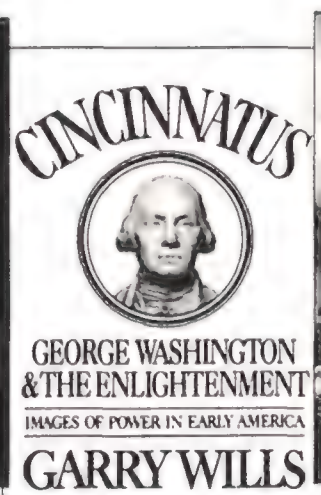
6759. $19.95/**$13.50**


ARCHAEOLOGY & SCIENCE DELVE 4,000 YEARS INTO THE PAST TO DOCUMENT
THE BIBLE AS HISTORY
SECOND REVISED EDITION
WERNER KELLER

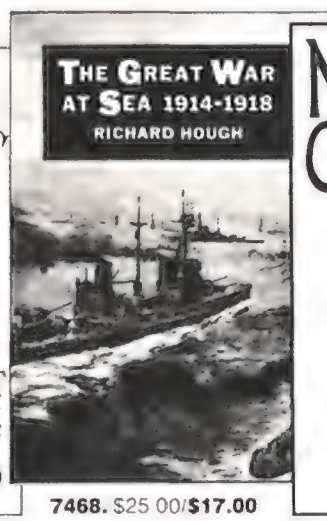
3012. $14.95/**$10.95**



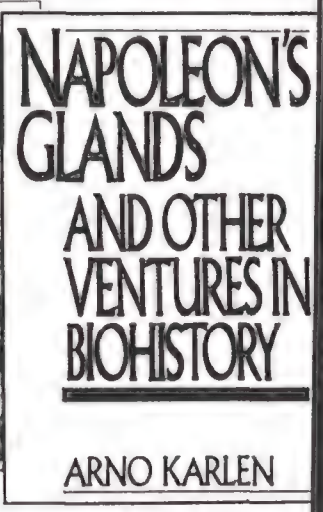
2055. $22.95/**$16.50**



8425. $18.95/**$13.50**



7468. $25.00/**$17.00**



1982. $15.95/**$13.50**

TAKE ANY 3 FOR 99¢ EACH

(values up to $110.00 with Trial Membership)

No matter what areas of history you enjoy reading about most, you'll find that The History Book Club offers some of the finest selections being published today. And no book club we know of offers greater savings—an average of 33% off publishers' list prices.

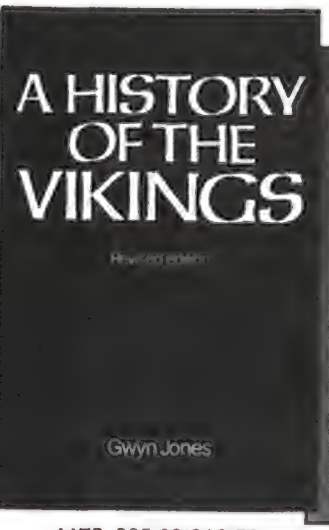
You can save even more by taking advantage of our Introductory Offer. Select any three books on this page for 99¢ each (values up to $110.00) when you take a fourth book at the low Members' Price. Your total savings as a Trial Member, including the Introductory Offer, can be more than 50%.

How the Club Works: As a Club member, you'll be able to choose from the 150 to 200 books featured each month. Our books are always equal to the publishers' editions, never "economy" reprints, and available a savings of $3, $4, $5, or more, off bookstore prices. You need take only fo more books in the next two years, after which you'll save even mo through Bonus Books that you may choose from our entire list.

Every four weeks (13 times a year), you will receive our *Review* and dated reply card. If you want the Editors' Choice, do nothing—the book w come automatically. If you want another book, or no book at all, return th card by the date specified. (Book shipments will be charged to yo account at low Members' Prices, plus postage and packing.)

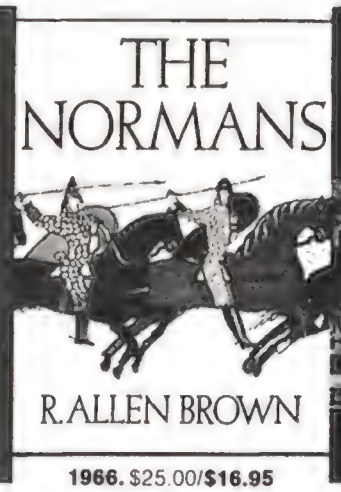
If you should get an unwanted book because you had less than 10 da to decide, you may return it and pay nothing. We guarantee postage.

First price is publishers' list.
Boldface shows Members' Price.

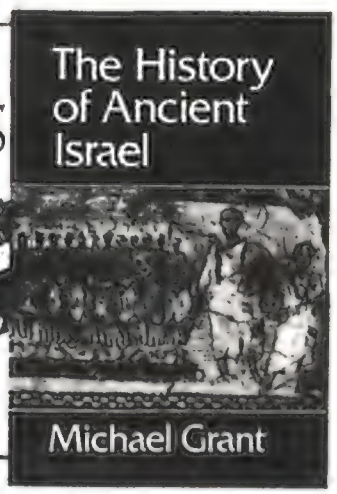


1172. $25.00/**$16.50**

1263. $19.95/**$14.50**



1966. $25.00/**$16.95**



8474. $19.95/**$14.50**

FALLEN EMPIRES, FLOURISHING LEGACIES

8490. **The Indian Frontier Of The American West, 1846-1890,** *by Robert M. Utley.* The final conflict between Indians and whites in the American West. $19.95/**$13.95**

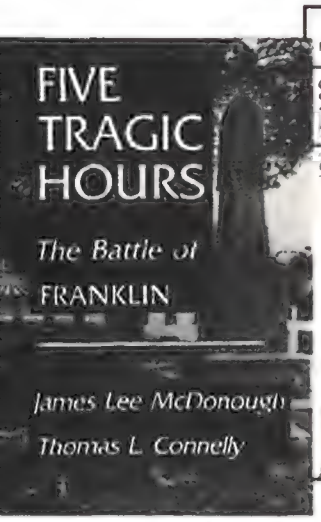
8524. **The Christians As The Romans Saw Them,** *by Robert L. Wilken.* $17.95/**$12.95**

1578. **Slavery And Human Progress,** *by David Brion Davis.* $25.00/**$17.00**

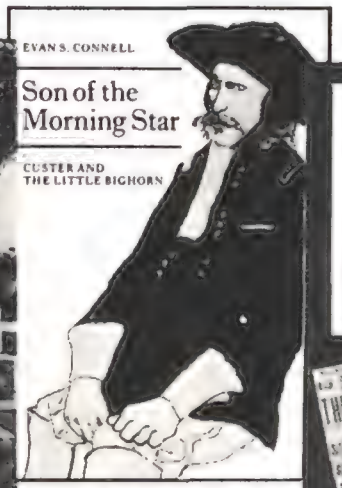
8573. **Popular Religion In The Middle Ages: Western Europe 1000-1300,** *by Rosalind And Christopher Brooke.* $19.95/**$14.50**

1487. **The Roman Empire,** *by Colin Wells* $35.00/**$23.50**

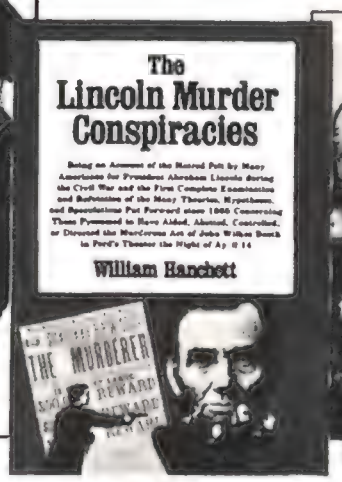
4820. **Wars Of The Roses: Peace And Conflict In Fifteenth-Century England,** *by John Gillingham.* Shatters the Shakespearian myth that England was plagued with violence, horror and civil disorder during the Wars of the Roses. In actuality, the campaigns were short and the sieges rare. $20.00/**$13.50**



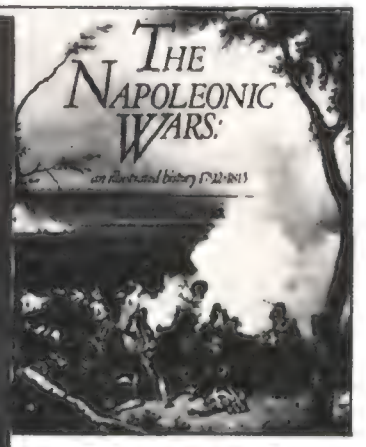
7856. $17.50/**$12.95**



2592. $20.00/**$13.95**



7559. $18.50/**$13.50**



7849. $22.50/**$12.95**

AGGRESSION, CONFLICT AND DIPLOMACY

6833. **The Name Of The Rose,** *by Umberto Eco* A spellbinding mystery that combines elements of history, Gothic fantasy and philosophy $15.95/**$11.95**

8508. **The Gurkhas,** *by Byron Farwell.* Describes the finest infantrymen in the world. $17.95/**$12.95**

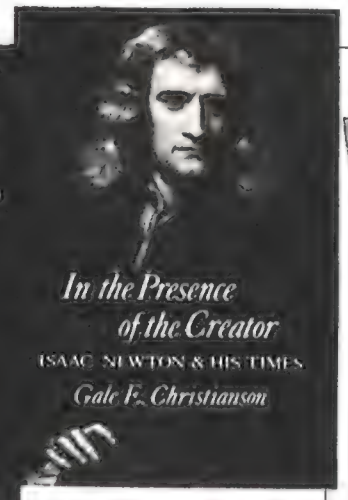
1537. **Hitler And The Final Solution,** *by Gerald Fleming.* An utterly convincing case that Hitler was ultimately responsible for the Holocaust $15.95/**$12.95**

8862. **The Gettysburg Campaign: A Study In Command,** *by Edwin B. Coddington.* $40.00/**$22.95**

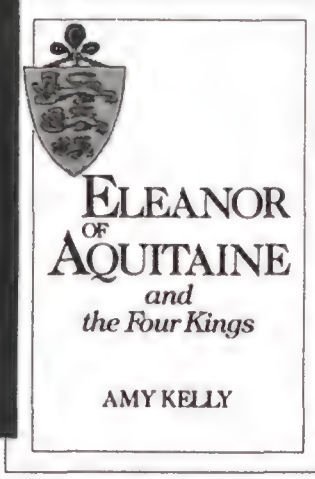
1867. **A Time For Courage, The Royal Air Force In WWII,** *by John Terraine.* Men, machines, policies and strategies. $29.95/**$18.50**

1602. **Battlefields Of Britain: The Comprehensive Illustrated Guide,** *by David Smurthwaite.* 78 of Britain's most notable battles. $24.95/**$17.95**

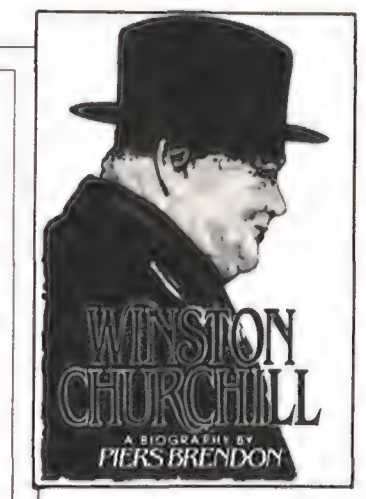
7401. $17 50/**$11.50**



1529. $27.50/**$18.50**



7187. $20.00/**$14.50**



1503. $16.95/**$12.95**

SHAPING HISTORY: THE MEN AND THE ISSUES

4911. **The Structures Of Everyday Life: The Limits Of The Possible, 15th-18th Century (Civilization And Capitalism, Vol. I),** *by Fernand Braudel.* $31.95/**$15.50**

6239. **The Wheels Of Commerce: 15th-18th Century (Civilization And Capitalism, Vol. II),** *by Fernand Braudel.* $35.00/**$15.95**

2006. **The Abandonment Of The Jews: America And The Holocaust 1941-1945,** *by David S. Wyman.* $19.95/**$13.95**

6155. **Keepers Of The Keys: A History Of The Popes From St. Peter To John Paul II,** *by Nicholas Cheetham.* $19.95/**$14.50**

8649. **World Religions: From Ancient History To The Present,** *Ed. by Geoffrey Parrinder.* $29.95/**$16.95**

A8102. **The Concise Columbia Encyclopedia,** *Ed. by Judith S. Levey and Agnes Greenhall.* A complete and authoritative desk encyclopedia featuring over 15,000 entries. $29.95/**$19.95**

(Counts as two of your three selections)

CASP85F

THE HISTORY BOOK CLUB, Dept. N, 40 Guernsey Street, Box 790, Stamford, CT 06904-0790

Please enroll me as a Trial Member and send me the four books whose numbers I have entered below. Bill those on the left at 99¢ each and the fourth at the low Members' Price, plus postage and packing.

☐ ☐ ☐ ☐

I may return the books within three weeks at your expense and owe nothing. Or, I will buy four more selections within the next two years, *not including my choices above*. Membership is cancellable anytime thereafter. All Club purchases are at low Members' Prices, and a postage-and-packing fee is added to all shipments.

In Canada: Mail to U.S. Address

Print Name_____

Address_____ Apt. #_____

City_____

State_____ Zip_____

ST79SK

Omaha Steaks International
Since 1917

Try a little tenderness Make those special occasions truly memorable! Just try a little tenderness. Candlelight, soft music, and, magnificent, aged Filet Mignons. Perfect. Experts select and prepare each filet! Their artistry in cutting and aging is your assurance of utmost enjoyment. Steaks arrive frozen. Complete satisfaction guaranteed. **INTRODUCTORY OFFER:**

Six 6-oz. Filet Mignons, 1¼" thick (reg. $52.95) $29.95
(plus $4.00 shipping/handling)

YOU SAVE $23.00!
OFFER VALID ONLY IN 48 STATES UNTIL JUL. 31, 1985.

SAVE EVEN MORE...
Twelve 6-oz. Filets at
Extra special price of $58.95
(plus $4.00 shipping/handling)

Limit - 2 packages per order
Phone or mail order. Use major credit card and

Call Free 1-800-228-9055
In Nebraska phone 0-402-391-3660 collect.
Order today or write for FREE catalog and 10% discount coupon.

Omaha Steaks International
Dept. 1426,/ P.O. Box 3300 / Omaha, NE 68103

"SO WHO NEEDS A TILLEY HAT?"

Because it's a rain hat and a sun hat, and because it floats, ties on, won't shrink, and lasts, *you know darn well who needs one!*

Acknowledged the world's best, most useful outdoor hat. Proven: America's Cup, major expeditions, but it's also for golf, fishing, hiking, travelling, gardening and puttering around. *"Damn fine hat."* says Laser-designer Bruce Kirby. Made with natural-coloured U.S. cotton duck, British brass, Canadian persnicketiness. Machine washable. Comfortable foam-filled inner band. Four-page owner's manual, Sizes 20½" to 27"(!). T1-$32.95, T3-$34.95,Shipping $3. Sent PDQ. Cheque, Visa, MC., AE. Refund? Any time.

"A focus on quality which really opens my eyes—even underwater!" (Dr. Joe MacInnis, first scientist UNDER North Pole).

We outfit adventurers (for example, *'Operation Raleigh')* with great-looking Tilley Shorts (6-pack carrying capacity, FREE lifetime replacement guarantee); tough, well-tailored, "fashionable" Tilley Pants (secret 7th pocket for passport, etc.); matching, dashing Tilley Safari and Bush Shirts. NEW! Tilley Cottons: no-iron, no shrinking, *(no kidding!)* comfortable casuals.

Free, interesting literature: 1-800-387-0266

1262SM Don Mills Rd.
Don Mills, Ontario
M3B 2W7, Canada

Tilley Endurables

Around the Mall and beyond

Dot etcher Earl Jones compares original transparency to color proof at Lanman.

Lolling on the shores of a lake near Roanoke, Virginia, right now, is one of the most important members of the team that has produced this magazine since it got off the ground more than 15 years ago. His name is Earl Jones, and you won't find him on the masthead because he's not on the staff, and never was. He has recently retired as a lithographer and dot etcher at the Lanman Progressive Company, the firm which, not without considerable magic, transforms the work of photographers into the illustrations that grace our pages. Jones is not just a lithographer. He's a craftsman. In an age when standards of excellence are measured electronically, his hand craftsmanship worked in close partnership with the machines to provide the quality that our magazine expects. That was his job.

We take a good deal of pride in the quality of the color reproduction in SMITHSONIAN, and much of the credit for that quality belongs to Earl Jones. To understand his contribution to the magazine during the past 15 years, you have to take a tour of Lanman—as I just did.

Probably everyone knows more about the color-reproduction process than I do. Having been an editor for years, I'm *supposed* to know, but when put to the test I can only duck my head and murmur generalities until someone with brains comes along and bails me out. However (gulp), here's the idea:

Let's say you are a photographer shooting pictures for SMITHSONIAN on a story about urban wildlife, and you get a charming photograph of, oh, a raccoon in a garbage can. Now, even if you are an expert photographer, color film has some limitations, as does film processing, and the picture may be less than perfect—the shadows too blue, the highlights a little too hot.

After the editors have selected your transparency, it goes to Lanman, where it's put into an electronic color scanner. In this marvelous device a high-intensity light beam probes across your transparency following one microscopic track at a time, reading the colors through four filters. Each filter blocks out all but one color. The scanner translates what it sees through each filter into electronic signals. A laser beam then converts that computerized information into four pieces of film (four versions of your photograph): one of all the reds it contains, one of all the yellows, one of the blues, one of the blacks. Each blob of, say, red in the red film becomes a heavy gathering of dots. This process is called color separation.

Each of the single-color versions can now be exposed onto a specially coated metal plate. By a mixture of chemistry and witchcraft, those plates can be inked and offset-printed on paper. When all the color plates are thus transferred to paper, one after another in the same place, you have a proof of your photograph with all four colors restored—a four-color proof.

That proof will probably look pretty good, but color reproduction is a subjective and imperfect science and people perceive color differently. So, magazine staff members proceed to critique the proof: the grass is too yellow, the sky a bit too green. "Take some yellow out," one says. "Yeah, but not from the lemon

Now you have the opportunity to acquire ...

THE STATUE OF LIBERTY

PEWTER SCULPTURE

Fully clad in copper from the actual Statue of Liberty

The Danbury Mint is proud to offer a magnificent pewter sculpture of the Statue of Liberty, entirely clad in copper from the actual Statue in New York harbor! *Indeed, a collectible of such meaning, beauty and interest may never come your way again.*

Commemorating the 100th anniversary of the world's most famous symbol of freedom and liberty

In 1886, President Grover Cleveland dedicated the Statue of Liberty, a gift from France honoring our democratic traditions. Today, the Statue of Liberty is being restored. In 1986, her centennial, she will be rededicated. The Danbury Mint is offering this beautiful sculpture in honor of this historic occasion.

Fully clad in copper from the actual Statue of Liberty

As the Statue of Liberty is refurbished, some of the copper must be removed. This has been made available to the Danbury Mint, and is being incorporated into each sculpture. Each will be fully clad in copper which until very recently was part of the Statue of Liberty in New York harbor! Moreover, the copper will be finished to replicate the weathered green patina of the venerable Lady.

Handcrafted with precision in American pewter

Each sculpture is meticulously crafted from rich American pewter, unsurpassed in its dignity. No other metal could have imparted to this sculpture the same noble bearing and stateliness.

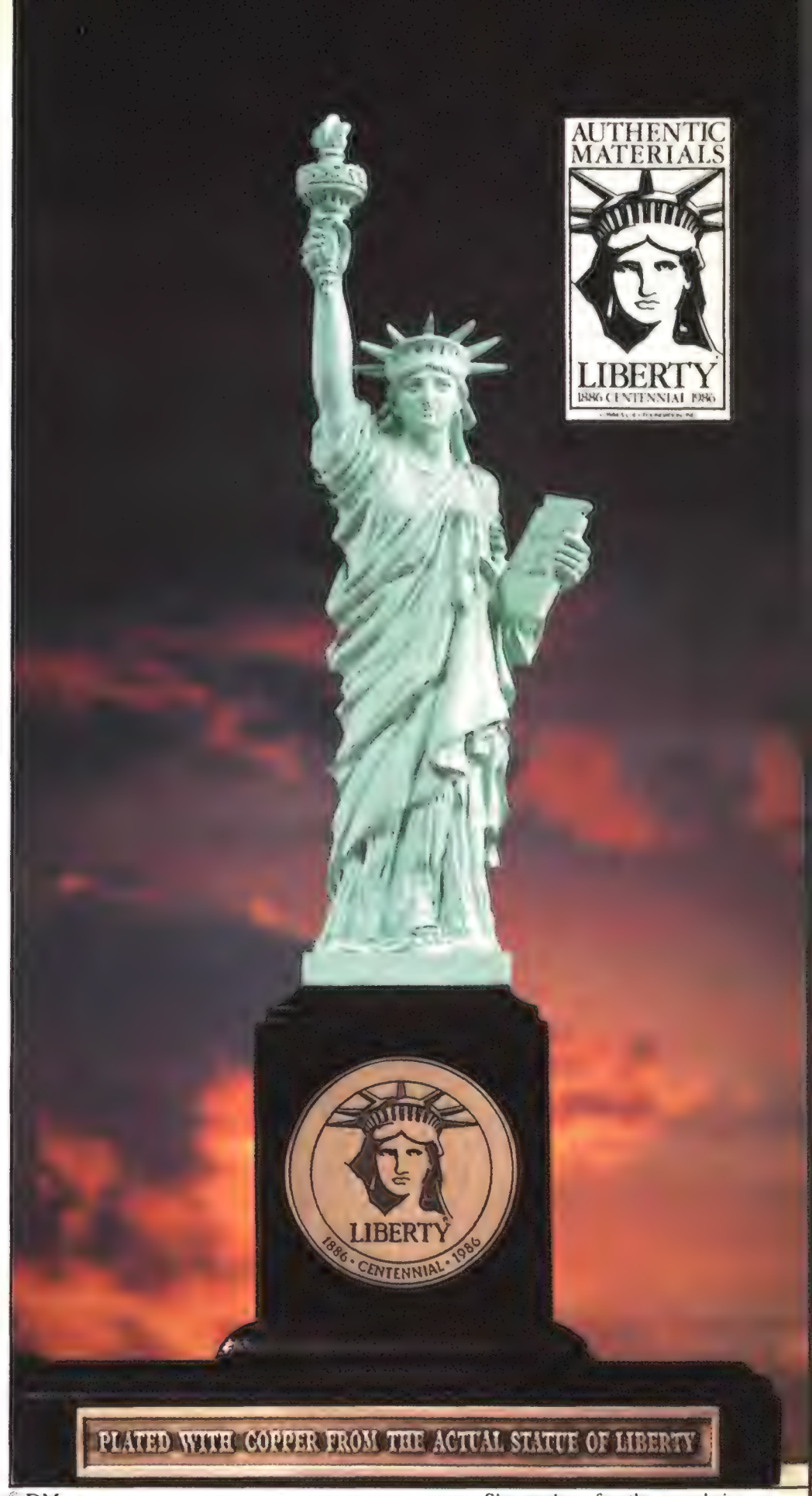
Your purchase contributes to the Statue of Liberty's restoration

You'll be pleased to know that a percentage of the sculpture's purchase price will be contributed to the Statue of Liberty — Ellis Island Foundation, Inc. Consequently, your purchase contributes to the Statue of Liberty's restoration. Accompanying your sculpture will be a Certificate of Authentic Materials, signed by Lee A. Iacocca, the Foundation's chairman.

A meaningful and unique heirloom

The original issue price of *The Statue of Liberty Pewter Sculpture* — complete with hardwood pedestal — is $150. This is an exceptional value when you consider that its authentic copper could make it irreplaceable in the years to come.

You will always be remembered for bringing this magnificent heirloom into your family. Don't miss this once in a lifetime opportunity, send in your reservation today!



© DM

Shown three-fourths actual size.

RESERVATION APPLICATION

The Danbury Mint
47 Richards Avenue
P.O. Box 5245
Norwalk, Conn. 06857

U5

THE STATUE OF LIBERTY
PEWTER SCULPTURE

Please return by September 30, 1985.

Please accept my reservation for *The Statue of Liberty Pewter Sculpture*, a pewter sculpture of the Statue of Liberty, clad in copper from the actual Statue. The sculpture comes with a hardwood pedestal at no extra charge.

I need send no money now. I will pay for the sculpture in four convenient monthly installments of $37.50 each, the first being billed before shipment of my sculpture. If I am not satisfied, I may return my sculpture within thirty days for a replacement or refund.

Name _____

Address _____

City/State _____ Zip _____

☐ Check here if you want each installment charged to your:

☐ VISA ☐ MasterCard

_____

Credit Card No. Expiration Date

Signature _____

Allow eight to twelve weeks after payment for shipment.

Dot-etching process has opened up the shadow detail and achieved more realistic flesh tones in Boy Scout picture on page 39 of this issue.

rind in the garbage," cautions another. So the proof goes back to Lanman.

Usually the transparency won't go through the scanner again, since the scanner, too, has some limitations. It can't, for instance, make selected changes in specific areas. For those persnickety adjustments, the transparency is passed on to a dot etcher—a real, live human being. This craftsman studies the yellow film—the one whose dots form the yellow segments of the whole picture. Meticulously, he paints a sealer onto the lemon rind, then dunks the yellow film into a bath that eats away at those dots, not destroying them, but reducing them. The solution doesn't affect the dots on the lemon rind because the sealer protects them from it. Presto! The yellow is weakened on the next proof—but *not* the yellow of the lemon rind.

There may be other nitpicks and proofs, but the final result of this and subsequent human fixes is a proof that usually pleases even the most finicky of the magazine people. That's the one the readers see.

That remarkable human being, the dot etcher, was, until recently, Earl Jones. His friends and colleagues at Lanman remember him as a pro, as a magician with a brush—utterly unperturbed by the size of a problem, extraordinarily skillful at solving it, ready to work long hours in the pursuit of excellence. "He never fussed about a customer's changes," says Charlie Noxon, who used to work with him. "And in this business, color corrections are a daily occurrence."

Jones got so adept at reading the minds of his particular customers (especially SMITHSONIAN) that he could foretell what they would want. When he knew that a certain picture should have certain aspects emphasized—should "go in one direction," as a colleague put it—Jones would take it on himself to make the necessary adjustments without being told. "If you asked him to do what he knew was the wrong thing," Noxon told me (knowing that I was the sort who would do just that), "he'd just do the *right* thing, instead."

I questioned Jones about this and he admitted that "it happened on occasion. After all," he added, "I couldn't help but get an idea of what the magazine needed after working on it so long." Looking back, he says, he always wished he could read the stories while he was involved with them. All he saw were the pictures, and he found it strange and interesting to see the whole article after the magazine came out. I asked if he noticed changes over the years. "The color work has always been very good," he said, "right from the start."

He looked forward to retirement in this particular spot in Virginia because one of his two sons, a doctor who opted for an unfashionable country practice, has, with a friend, set up a family clinic in nearby Christiansburg. Jones planned his retirement for two years and, says Noxon, "is as happy as a kid."

Meanwhile, back at the plant, Steve Lovasz, Earl's assistant for the past five years, is now doing the job. He takes over from a talented practitioner who, as Lanman's color coordinator Jack Burman notes, "proved that the human touch is still needed on illustrations produced by the most modern electronic color scanners available." In other words, the man now having a ball down in the Old Dominion managed to stem the onslaught of the computer age and restore confidence in the hand of Man. And that makes me feel a little bit better about the world.

I also got a good feeling when I visited the Smithsonian's Office of Telecommunications, where my old friend Nazaret (Chick) Cherkezian consistently, and without the blast of trumpets, supervises one piece of excellence after another.

In late June, it was *The Work of Peace* on public TV, describing that complex business of the Treaty of Paris and ending the American Revolution (SMITHSONIAN, September 1983). Another old friend, Paul Johnson, produced this show and reminds me that it will be followed on the 12th of *this* month by *In Open Air: A Portrait of the American Impressionists*, which focuses on such painters as Childe Hassam, William Merritt Chase and John Twachtman, and the gentle north country light and intimate New England landscapes that inspired them (SMITHSONIAN, January 1982).

So much for the pursuit of excellence, this month, anyway.

Edwards Park

Picture credits

Cover courtesy Boy Scouts of America; 20 Phil Lambert; 22 Don Moser; 26 P. W. Grace/Photo Researchers; 32 David Falconer; 34-35 courtesy Boy Scouts of America; 36 Mike Roytek/Boy Scouts of America; 37 David Falconer; 38-39 Don Moser; 40 Mike Roytek/Boy Scouts of America; 41 David Falconer; 46 Terrence Moore; 48 Laboratory of Tree-Ring Research/University of Arizona; 48-49 Terrence Moore; 50 Laboratory of Tree-Ring Research/University of Arizona; 50-54 Terrence Moore; 55 David Muench; 58-62 Worcester Art Museum; 63-65 Metropolitan Museum of Art; 68-74 Dwight R. Kuhn; 78-87 James Balog; 91-96 Kay Chernush; 100-111 Michael Freeman; 114 Robert C. Lautman; 115 Christopher Springmann; 116 Bar-Brown/Camera Press, London, courtesy of the Archives/California Institute of Technology; 117-19 Computer Graphics Laboratory/University of California, San Francisco; 122 H. Josse/Musee des Deux Guerres Mondiales/BDCI (Universites de Paris); 122,123 Musee de la Marine, Paris; 123 H. Josse/ Musee des Deux Guerres Mondiales/ BDCI (Universites de Paris); 124 Musee de la Marine, Paris, Bettmann Archive; 126 D. R. Pollard and Assoc., Robert Hunt Library, London, H. Roger Viollet; 127 AP/ Wide World Photos; 128 Robert Hunt Library, London; 130 Bibliotheque Nationale, Paris, Alistair Horne; 132-34 Robert Hunt Library, London; 136 Military Archive & Research Services, Lincolnshire; 138 Musee de la Marine, Paris; 141 Bettmann Archive; 148 Renwick Gallery; 149 Cooper-Hewitt Museum; 152 Loel Barr

CORVETTE

THIS AMERICAN WENT EYE TO EYE WITH EUROPE... AND EUROPE BLINKED.

Exotic Europeans have traditionally dominated the high-performance sports car class. But in recent United States Auto Club performance trials, the exotic American was the overall winner. The 1985 Corvette. So please join Ferrari, Porsche, Lotus and Lamborghini in a hearty welcome to a new world-class champion. The 1985 Chevrolet Corvette.

USAC Competitive Rank

	Corvette	Lamborghini Countach	Porsche 944	Ferrari 308 GTSi	Lotus Esprit Turbo	Porsche 928S
Total Points	21	18	14	11	11	9
Acceleration 0-60 (sec.)	4 (6.00)	6 (5.33)	1 (7.95)	3 (6.43)	5 (5.95)	2 (6.66)
Braking 60-0 (ft.)	6 (129.2)	3 (135.7)	4 (135.2)	2 (143.1)	1 (144.7)	5 (135.1)
Slalom (sec.)	6 (6.13)	3 (6.38)	5 (6.33)	4 (6.36)	2 (6.40)	1 (6.62)
Lateral Acceleration (g's)	5 (.91)	6 (.92)	4 (.86)	2 (.83)	3 (.85)	1 (.82)
Price as Tested	$26,703	$103,700	$26,121	$60,370	$50,384	$49,495

Scoring based on an Olympic system in which first place is awarded 6 points for each event. USAC certified tests, January 1985. All cars listed were latest models available for sale in the U.S. at time of testing and were equipped with various high-performance options. Corvette's Manufacturer's Suggested Retail Base Price is $24,891 including dealer prep. Tax, license, destination charges and optional equipment additional.

TODAY'S CHEVROLET

FINALLY, LIFE AS INDIVIDUAL

INSURANCE AS YOU ARE.

With Prudential offering more types of life insurance than any other insurance company, we're confident we have a policy that's designed to meet your individual needs.

For instance, if you want both high interest and high premium flexibility, we can offer you APPRECIABLE LIFE.℠

Or, if you want to play a more active role in investment decisions, there is Variable Life. Where you move your cash value in, out and around five Prudential managed accounts: stock, bond, money market, an aggressively managed account and a conservatively managed account.

And if you want even more control of your life insurance, you'll appreciate the combination of investment flexibility and premium flexibility of Variable APPRECIABLE LIFE.

If you're interested in interest but want to leave all the investment decisions to us, there is LIFE BUILDER.℠ It offers the predictability of fixed premiums. The high interest of current market rates. And the investment skill of The Prudential.

What's more, the rest of Prudential's Permanent Life insurance portfolio now offers more value than ever, with current dividend schedules based on today's high interest rates.

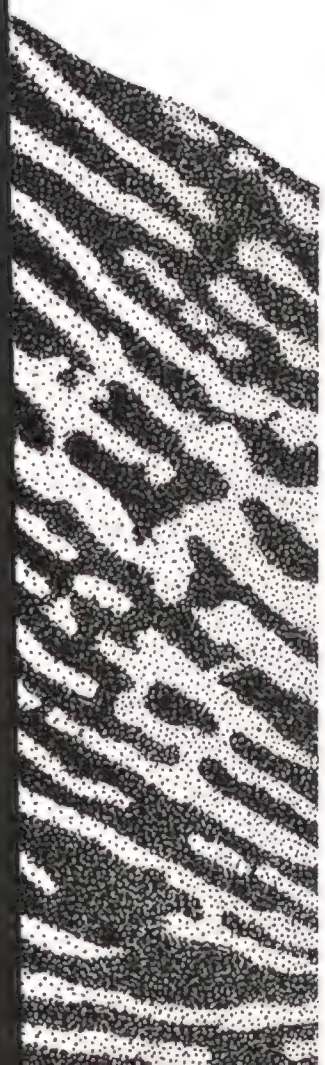
All these policies provide guaranteed lifetime protection. However, if you're looking for short-term protection, Prudential offers competitively priced Term Life insurance.

Of course, whichever life insurance matches your lifestyle, you know it is from The Prudential, one of the world's largest, most trusted financial institutions.

Why not let a Prudential/Pruco Securities representative review your needs to help you put your finger on the one policy that is unmistakably yours.

For more complete information about Variable Life or Variable APPRECIABLE LIFE, including fees and expenses, send for a prospectus. Read it carefully before you invest or send your money.

The products mentioned here are not yet available in all states. APPRECIABLE LIFE and LIFE BUILDER are service marks of The Prudential Insurance Company of America. Variable Life, APPRECIABLE LIFE and Variable APPRECIABLE LIFE are issued by Prudential subsidiaries: Pruco Life Insurance Company and Pruco Life Insurance Company of New Jersey. Variable Life and Variable APPRECIABLE LIFE are sold through Pruco Securities Corporation, Newark, NJ.
Interest rates may vary from year to year.



The **Prudential**
Life Insurance

© 1985 The Prudential Insurance Company of America, Newark, N.J.

Phenomena, comment and notes

Archetypal beach scene may represent entirely different interests to the physicist and to the birder, not to mention the artist.

Walking the beach with a physicist opens up a universe in which one can see planet-shaping forces at work

Let it be clear that I am no slouch when it comes to beaches. I have walked them summer and winter, in sunshine and in horizontal rain that felt like bird shot, on days when the sea was glassy and days when a storm threatened the land. I have been there body surfing, birding, surf casting, gathering seaweed for mulch, beachcombing for treasure, or just walking. I feel as at home on a beach as any "civilized" person can feel in a wild place.

Yet a single six-mile stroll on a warm day last spring opened my eyes to a whole new way of seeing the beach, of understanding and even quantifying what is happening there. Walking with me was a frequent contributor to these pages: Jim Trefil, a physicist at the University of Virginia who has a knack of seeing the extraordinary in the commonplace (his article on tree rings starts on page 46 of this issue). He is no slouch when it comes to beaches, either; his book, *A Scientist at the Seashore*, was recently published by Scribner's. That day, each of us was going to teach the other something about the way he thought about what he saw.

The sea is calm and waves breaking on the beach are a foot to a foot-and-a-half high. Even that gentle a surf, however, stirs up the sand. Jim points out to me that the waves are not arriving perpendicular to the beach, but rather at a slight angle. The water comes at us from a bit to the left and washes back a bit to the right. He starts counting the time between waves and finds that one breaks about every ten seconds. He stands in the wash, watching individual grains of sand move, doing calculations in his head. If a grain of sand is moved only an eighth of an inch by each wave, he reasons, then about 9,000 waves a day could move it more than 90 feet, amounting to several miles a year.

We walk farther. I keep using binoculars to look up the beach, counting willets, grackles, ring-billed gulls. Jim is pointing out that incoming waves break when their height is slightly more than three-fourths the depth of the water. They break in different ways, depending on the configuration of the ocean floor and on how much faster their tops are going than their bottoms. We move up into the dry sand near the dunes, where I spend my time trying to follow raccoon tracks until he shows me the color patterns in the wind ripples: because of their varying masses, grains of different minerals are transported differently by the moving air.

Farther up we stop for lunch. Jim is thinking about the falling tide and how the tidal bulge in the ocean caused by the moon cannot keep up with the moon as we spin underneath. He believes you can see the basic forces that run the Universe anywhere, even the beach. I watch terns plunging into the water just beyond the surf and imagine I can feel the pull of the moon on the Earth beneath me.

All is not gravitation and energy. Sitting there I suddenly realize that some of

Only Sun Line gives you the Windward and Leeward Islands and the Orinoco River.

1985/86 CARIBBEAN/ORINOCO RIVER CRUISES.

14-DAY CRUISES. Round trip from SAN JUAN. DEC. 20, JAN. 3,* JAN. 17, JAN. 31, FEB. 14, FEB. 28.

ABOARD THE STELLA OCEANIS.

The Orinoco jungle hides a waterfall that sprays the sky. There's an island in the Windwards so beautiful we're lucky the world hasn't caught on. Why settle for routine routes?

***SPECIAL $200 SAVINGS.**

800-468-6400

In New York City: 212-397-6400.
Consult your travel agent.Or mail the coupon.

Sun Line, One Rockefeller Plaza, Suite 315, NY, NY 10020. Please send information on your Caribbean/Orinoco River Cruises.

Name_____

Address_____

City_____ State_____ Zip_____

SM7

Luxury ships of Grecian registry.

Sun Line Cruises

Anything else is a compromise.

The Season's Best Buy FREE

From stocking stuffers to extravagant gifts. The best of everything for the holidays and year 'round is to be found on the pages of The Horchow Collection catalogues. The season's best buy. Let us send you our big Holiday issue FREE.

Name

Address

City State Zip

HORCHOW

P.O. Box 819066, Dept. NA211
Dallas, Texas 75381-9066

100% Cotton

SAHARA shirt $16

2 for $15 each
3 for $14 each

#1603 Natural, blue violet, stone, clay, white

XS S M L XL
Imported

BANANA REPUBLIC
TRAVEL & SAFARI CLOTHING Co

SEND $1 FOR OUR AMUSING CATALOGUE
SEND CHECK, VISA, AMEX, M/C, DC TO 224 GRANT AVENUE, DEPT. 853 PO BOX 7347, SAN FRANCISCO, CA 94120
ADD $2.00 FOR SHIPPING, CALIF. ADD 6% SALES TAX
ORDER TOLL-FREE 800-527-5200.

the "willets" probing the sand have long bills that curve downward. Their heads are striped fore-to-aft. They are whimbrels, refueling on their way to Arctic breeding grounds. So far Jim has paid no attention to the birds along the beach, but he is interested in the whimbrels and how far they migrate. He becomes fascinated with birders, people who will travel hundreds of miles to see one bird, and decides he may begin a life list. It is he who first spots two American oystercatchers—flashes of bold black and white with heavy, long red bills—flying north along the surf line. Later, I log his sighting at the ranger's station to give his list an official start.

Back down the beach. I am still looking at birds, Jim concentrating on the waves. When conditions are just right, he tells me, a hydraulic jump occurs. This can happen when a large wave has finished its run up the beach and the water is flowing back toward the surf. The next wave breaks, and the water in that wave is headed for shore, but it is moving on top of water that's moving rapidly the other way. Finally the new wave can make no further forward progress, but boils and churns in place, a stationary wave on top of the receding wash.

In the meantime the wind has shifted around so it is blowing out of the south at about 15 knots. It is blowing straight up the beach, parallel to the surf line. Jim points out to me that within half an hour a whole new pattern of ripples has appeared in the dry sand. I had never paid much attention to the ripples. To me they were just the unseen background against which I looked for living things.

Farther down I do see a living thing, a duck-size black bird plumped down on the wet sand just above the reach of the waves. As we come closer I see the white patches on the front and back of the head and the lumpy orange-and-red bill. The surf scoter stares at us with what seems a distinctly jaundiced eye until we get to within 15 feet, then flies heavily out over the water, red legs dangling, to land just beyond the surf. I am excited at having been so near a bird I had never seen up close before; Jim, who had held back to give me the best chance at getting close, asks why I wanted to do so. Up to now, the birds have been just part of the unseen background for him, he says, transients across the stage where energy and gravity, fluid mechanics and surface tension play out their parts.

He has plenty to look at: the foam left by a receding wave is a sheet of small bubbles, iridescent from the right angle, sparkling when seen against the sun. Sometimes I watch them the way I watch a fire—dreamily, out of focus. Jim watches them shrink, water running down their sides, until the air pressure inside equals the surface tension shrinking them and the bubble reaches equilibrium. Water droplets, which act much like bubbles, became the model for Niels Bohr's description of the atomic nucleus, one of the first coherent explanations of the atom's core, Jim tells me. The strong force binding the neutrons and protons together is the analogue of the surface tension that condenses a bubble or water droplet, while the electric force, which repels like-charged particles inside the nucleus, is the analogue of the pressure inside such spheres that resists further shrinking.

Bursting bubbles inject matter into the atmosphere, plankton and algae as well as salt. As the air pressure inside increases, the bubble pushes down into the water. When the bubble breaks, the pressure is released and the depressed portion of the water surface springs back toward normal. It actually goes too far and a column rises up where the depression was. The rising column breaks into drops, some of which are ejected as much as a foot into the air. The drops then evaporate, leaving the plankton and algae to be carried by the wind. The quantities involved are enormous: foam and its bubbles form not just where waves are breaking alongshore, but anywhere waves are breaking in the open sea (whitecaps). At any one moment, an area of the Earth's surface roughly the size of North America is covered with foam. In a year, several hundred million tons of dried organic matter will find their way into the atmosphere in this way.

Back in the parking lot, tired and sunburned, my mind is whirling with the sensations of having seen and understood elemental forces at work. Jim has been taken with the little I've been able to tell him about birds and the people who study them, but neither of us shows signs of switching allegiance. "It's beautiful and interesting," he offers. "But it just isn't physics."

John P. Wiley jr.

ENTER THE WORLD OF ALPINE MOBILE ELECTRONICS

That Lamborghini has chosen Alpine for so many years is understandable. Alpine offers mobile audio, security and cellular telephone systems of extreme quality, precision and performance.

Through them all runs an uncommon denominator: The Alpine Touch, an attitude of uncompromised quality from design inception to final installation.

It creates car audio systems equal to the finest home electronics. Mobile security systems able to outsmart the smartest thief. And mobile cellular telephones of unsurpassed efficiency.

Alpine Dealers, justifiably called Mobile Electronics Specialists, are equally strict in system selection and installation. For such carefully-selected professionals, only flawless fit and finish will do.

Not every driver demands such precision and performance. But for those who are so demanding, there is The Alpine Touch. Enter the world of quality mobile electronics. Call 1-800-ALPINE-1 to reach an Alpine Mobile Electronics Specialist near you.

ALPINE
mobile electronics systems

Lamborghini Has The Alpine Touch

Alpine Electronics of America, 19145 Gramercy Place, Torrance, CA 90501

Our neighborhood is the finest in the world.

But it's getting a little crowded.

Years ago, when Gallo first came to California's famed Sonoma and Napa growing regions, the neighborhood wasn't quite so crowded.

There were the Beaulieus, the Mondavis, and the Martinis.

And just over the hill, lived the Kenwoods.

But when the rest of the world discovered the extraordinary quality of our wine grapes from Sonoma County and the Napa Valley, we had folks moving in from just about everywhere.

Now there are the Heitzes, and the Jordans,

© 1985, Ernest & Julio Gallo, Modesto, CA

and the Montelenas, and some folks with rather odd names, like the Duckhorns, and the Stag's Leaps.

Yet today, even though there are more folks around, Gallo still makes more wine with premium Sonoma and Napa grapes than any other vintner.

And we still continue to experiment with new strains of varietal grapes, better methods of growing our grapes, and improved harvesting and winemaking techniques, as we have since we first came here.

Because we're never satisfied with being just the same as folks next door.

We want to keep improving the neighborhood.

Today's Gallo.

By Don Moser

At 75, the Boy Scouts still answer to the call of adventure

Scouting has suffered setbacks in recent years, but it remains the most successful youth organization in the nation's history

In the summer of my 14th year, at a Boy Scout camp in Cleveland, Ohio, I won by default the most magnificent neckerchief slide in the history of creation. The purpose of the camp was to train selected boys to be the "naturalists" for their troops. The slide, the device that fastens the Scout's distinctive scarf, began as a rough block of red cedar in the hands of the large, infinitely patient man who was our group's instructor. Hiking in the woods, as he shared with us his considerable wisdom about everything from salamanders to red-tailed hawks, he worked at the cedar with a sharp penknife, and over the four days of the camp the shapeless lump of wood became the sculptured head of an Indian chief. The face, with its high cheekbones and aquiline nose, was formed from the red heartwood; from the pale surrounding wood emerged an eagle-feather war bonnet. On the last night of camp the instructor displayed his finished masterpiece. The following morning, he said, he would test us on the trees he had taught us to identify. The neckerchief slide would be won by the Scout who achieved the highest score.

I coveted that carving, and I knew that I had only one real competitor—a bright, lippy, redheaded boy with an admirable repertoire of off-color songs. The next morning, I identified 19 species of trees; the redheaded boy identified 20. But at the award ceremony the leader announced that the other boy's behavior had been a disgrace to Scouting. And so the neckerchief slide went to the runner-up: me.

As we were packing up our duffel I felt more guilt than pride. Although the Scout Law did not cover this precise situation, I knew what a good Scout would do. He would walk up to the redheaded boy and say: "You won it, fair and square. Here—it's yours."

I kept the neckerchief slide. I have it still.

In 1985 the Boy Scouts of America, all 883,000 of them, celebrate their 75th anniversary. Later this month at the National Jamboree about 28,000 Scouts from across the country will encamp at Fort A. P. Hill, Virginia, to build campfires, cook kabob, swap insignia, canoe, demonstrate woodcraft and let off youthful steam. The Jamboree always gets abundant publicity, and I suspect that during that week several million fully grown American men will stop for a moment to reflect on their own experiences in Scouting, and take some time to bore friends and relatives with their reminiscences.

The Scouts have had their problems in recent years —declining membership, failed expectations and wrenching changes as they have tried to adjust to shifting social priorities. But, for all that, the Boy Scouts of America is the most successful youth organization in our history or anyone else's. Since 1910 more than 70 million Americans have participated, in one way or another, in the Scouting movement, and at the peak in the early 1970s there were nearly five million members of the Scouts proper and auxiliary programs such as Cubs for younger boys and Explorers for older youths. The very title "Boy Scout" is uniquely a part of the American vernacular, conjuring the image —depending on one's set of mind—of youthful vigor and integrity or of nerdy disingenuousness. This is the organization immortalized by Norman Rockwell (see cover), an artist whom it is fashionable to disparage, but never mind: his paintings of firm-jawed, clean-cut youths—not without a glimmer of mischief about the eyes—have inspired veritable armies of American

After warming his mouthpiece by dipping it in hot chocolate, Brian Lawrence sounds reveille in camp.

A 1940s youth lived up to the Scout's promise—"Do a good turn daily"—by mending a little girl's wagon.

In 1939 this Scout was one of many who aided old soldiers at a Civil War veterans' Gettysburg reunion.

youngsters. The *Handbook for Boys*, that chunky, durable compendium of moral instruction and practical information, has had more than 31 million copies printed, perhaps more than any book except the Bible. Notable Americans from William DeVries to Neil Armstrong, from Gerald Ford to Steven Spielberg, have pointed with pride to their affiliation with Scouting, and quite a few Americans less notable have done the same.

I remember a couple of years ago when I was trying to show my wife how to tie a knot, a bowline. An old mnemonic flashed into my mind. "The rabbit comes out of the hole," I said, demonstrating with the running end of the rope. "It goes around the tree, then goes back in the hole."

"Where did you learn to do that?" she asked.

"In the Boy Scouts," I said. "Let me show you the square knot," I went on, pleased with myself. "It's left over right, right over left—do it wrong and you'll get a granny knot, which slips."

The knots are a legacy of Troop 161, of Euclid, Ohio, the unit to which I belonged in the years around the end of World War II. The troop's artifacts and activities filled a good part of my youth. There was the knife—clunky, tool-laden and as faddish as the Swiss Army knife is today. There were the badges of achievement and rank, from lowly Tenderfoot up to exalted Eagle. There was the canteen, the knapsack and the official Eveready flashlight with its belt clip and special button for sending Morse code messages.

In Troop 161 we hiked and camped, we cooked kabob and bean-hole beans, drank vast quantities of Kool-Aid, and when older occasionally smuggled into camp bottles of sweet wine wrapped in our blankets. We collected tin cans and newspapers for the war effort, and marched raggedly on ceremonial occasions. (Anyone worried about the Scouts being excessively military would have been reassured by the spectacle of Troop 161 on parade.)

Except for a couple of overachievers we were fairly indifferent about earning merit badges, those symbols of expertise in fields as varied as lifesaving and beekeeping, but we had a good fix on one part of Scouting's message—the part about it being more fun to horse around in the woods than it was to horse around anywhere else. We got a stiff dose of the environmental ethic a couple of decades before the country at large had ever heard the words. We learned some skills that we would never have any earthly use for, such as the ability to build a monkey bridge or to send messages in semaphore code, but the mere acquisition of them fueled some benign adolescent dreams—if we were

Former Scout Don Moser is the Editor of SMITHSONIAN. *He only reached the rank of First Class in Troop 161.*

ever, say, called upon to go exploring with Byrd in the Antarctic (as was Eagle Scout Paul Siple), we would be, by God, prepared.

And something else. Scouting was a way to get away from home, a parentally approved form of escape. If you had no particular athletic abilities, you might still be the one to fearlessly capture the five-foot blacksnake. In camp you could talk about girls without having to do anything so terrifying as ask one of them to dance. If your family was of limited means, in camp there was no need for money. If you were socially uncertain in school, where most of your contact was with peers, in Scouts there were always younger boys to lord it over and older boys who found your company at least tolerable. What Scouting did was give you a little time—a little time, and elbow room to work things out.

Such modest benefits were probably not even a part of the vision of the men who started Scouting three-quarters of a century ago, certainly not for the "father" of the Scouting movement. Lt. Gen. Sir Robert Stephenson Smyth Baden-Powell was a British Army officer who had commanded the garrison at Mafeking, in northern South Africa, during the Boer War. For 217 days the Boers kept Mafeking under half-hearted siege—on Sundays, when both sides took the day off, the relentlessly cheerful Baden-Powell managed musicales at which he played the piano and sang Gilbert and Sullivan—but he emerged from the war an enormously popular national hero. Returning to England after years of foreign service, B-P, as he came to be known, was appalled by Britain's liberal drift and by the caliber of the nation's youth, particularly the unruly lower-class youth on whom the army drew for its recruits. They were, he wrote, "without individuality or strength of character, utterly without resourcefulness, initiative or guts for adventure."

To shape up "miserable specimens"

The solution Baden-Powell invented was the Boy Scouts, a youth organization that, using outdoor adventure as a lure, would turn "pale, narrow-chested, hunched-up, miserable specimens" into sturdy, patriotic, self-disciplined young men.

Baden-Powell created a program and wrote a book which still has the capacity to charm any but the most cynical. *Scouting for Boys* is a tone poem to vim and vigor—a mixture of fieldcraft, nature lore and yarns about heroic youths through history, all salted with inspirational cheerleading and delivered with the bonhomie of a plucky commander bracing his troops for an enemy assault. "There is jolly good fun in bathing," B-P counseled chirpily. Once a boy gets into the habit of arising early, "it is no trouble at all to him, as it is to some fat fellows who lie asleep after the daylight

At his English country home, old Scout Baden-Powell kept Labrador retrievers and always slept outdoors.

On 90th birthday in 1940, buckskinned "Uncle Dan" Beard imparted some woodsy wisdom to a Cub Scout.

Ernest Thompson Seton led youth organization called the Woodcraft Indians; later he became Chief Scout.

Lowering of the colors: at dusk, Fort Worth Scouts will fold a Texas-size flag into a neat triangular package.

has come." Baden-Powell's ideas were new, his enthusiasm contagious, and from the beginning his Scouting program was hugely successful.

Almost immediately the program crossed the Atlantic, for in 1910 concerned progressives were seeking a solution to what they saw as the physical and moral decline of the United States. Through industrialization, urbanization and corrupt politics, the gritty virtues of our pioneer stock had eroded away. As one of Scouting's early leaders put it, "*City rot* has worked evil in the nation." The men who started the Boy Scouts were, by and large, idealists who believed that they could restore the country's virtue through an army of manly youths inculcated with the proper values. Foremost among these men were three who have been characterized by scholar Carolyn Ditte Wagner as two "dreamers" and a "clerk."

Both of the dreamers were artists, writers and naturalists who could be charitably described as eccentrics. British-born Ernest Thompson Seton had survived a sickly and troubled childhood—when Ernest reached his majority his father presented him with a bill for the services of the midwife who had attended his birth—to win fame in North America with such popular books as *Wild Animals I Have Known.* (The distinguished naturalist John Burroughs, irked by Seton's fanciful accounts, suggested that it should have been called *Wild Animals I Alone Have Known.*) The other dreamer, Daniel Carter Beard, had grown up in Kentucky during the Civil War and had celebrated his Tom Sawyerish childhood in *The American Boys Handy Book,* a how-to-do-it guide that beguiled a couple of generations of American youngsters with its formulas for building everything from a cornstalk fiddle to a snow fort.

Seton seldom bathed or cut his hair, signed his drawings with the print of a wolf's paw, and thought of himself as a messiah whose mission was to spread to the nation's youths the ethos of the American Indian. "Uncle Dan" Beard affected buckskin clothing and a coonskin cap, and preached a jingoistic brand of patriotism. But both were outdoorsmen and pioneer conservationists, filled with a love for the natural scene, and their spirit has suffused the Scouting movement to this day.

Ironically, their superior, the Chief Scout Executive, was a man whom Seton described acidly as someone who had "never seen the blue sky in his life." James E. West—the clerk of the troika—overcame an orphanage childhood and a crippled hip to become prominent in youth work in Washington, D.C. Whatever West's shortcomings as a woodsman, he was a consummate bureaucrat with a finely tuned sense of public relations.

With Seton and Beard providing inspirational role models and West providing organizational genius, the Boy Scouts took off, reaching a membership of 100,000 by 1914 and more than a million by the outbreak of World War II. But if the leaders were trying to create an army of hope in knee pants, what they usually got, I suspect, was probably more like Troop 161: a bunch of fairly ordinary kids more apt to cook up a snipe hunt (in which some hapless tenderfoot is duped into spending the night in the woods trying to ensnare an animal that doesn't exist) than to help old ladies to cross streets.

Snakebite medicine and penny ante

Despite such frivolousness—or perhaps because of it—Troop 161 is still alive and well and living in Euclid, an industrial suburb of Cleveland. Not long ago I returned to accompany the boys on a weekend camp at our old Scout lodge. The plank building, on a timbered tract east of Cleveland, was built in the 1940s, mostly by Scouts and their fathers. At night the fathers fortified themselves with snakebite medicine and played poker by the fire, while we played penny ante in our bunks on the balcony.

The lodge smelled of mold and woodsmoke and damp woolen blankets. The overarching trees, maple and beech and hemlock, made the days dark, the light as green as if filtered through old bottle glass. It was always quiet, only the sounds of the cicadas in the daytime and the katydids at night. There were raccoons and skunks—I kept a baby skunk during summer camp, feeding it on woodland snails. We played base-

The fun of Scouting: at camp in Washington State, it's Jim Bartleson's turn to wash up the breakfast dishes.

Fire without matches: a smoky job with flint and steel as these Scouts compete to burn a string in two.

ball with our fathers in the evening in a nearby field, and we learned how to fold the flag properly, in neat triangles, so that only the blue field showed. We told jokes so crude and tasteless that I wince when I think of them now, and we experimented at cooking wild foods, with disastrous results. The sassafras tea was thin, the freshwater mussels repulsive, and the time we caught the snapping turtle and tried to make soup out of it, the bloody mess we made of the poor creature left us with no appetite. I saw my first deer there—deer were rare in Ohio then—during a winter camp. We came over a ridge and there they were, bursting away over the white snow under a blue sky, their white flags flashing, an image I will never forget, and the most beautiful thing that I, at 13, had ever seen.

Things haven't changed much. The lodge is a bit run-down, the old ball diamond overgrown with trees. At night, now, you can hear the hum of traffic on Interstate 90 not far away. But mostly the sounds are the same, and the smells, and the filtered green of the light.

Jess Saba is the Scoutmaster. He is 33, compact and mustachioed. He has been a part of Troop 161, as a Scout and later as a leader, for 23 years. He is a grocery clerk at Pick-N-Pay (my Scoutmaster had been a postman), and he describes himself as a maverick. His rebelliousness has to do with money—his Scouts' money. In Cleveland unemployment is high, and of the 24 boys in the troop, four have fathers who are out of work. Jess can get feisty over prices. "When the official uniform was changed, I said, No way! When the uniforms got worn and thrown out, that's when we changed." He rails at the Greater Cleveland Council

Finding the way: young Evan Frankovich of Troop 377 in Florence, Oregon, takes lesson in compass work.

Troop 161's 13-year-old Shawn Denholm works on Environment Skill Award with assistant Scoutmaster.

for its charges at the big Beaumont Scout camp, and once, in protest over cabin fees at a winter outing, Jess had his troop polar-bear camp in the snow—for free.

There are 12 boys in camp, from ages 11 to 16. With them Jess is watchful but outwardly relaxed, gentle in his corrections. When the language gets a little rough: "All right, watch your tongues, you're in Scout camp, you know." When Jason cut his finger on a reed: "No, you don't need to put pressure on it, it's like a paper cut, just hold your hand over your head and the bleeding will stop." When Pete goes wading in the river with his new boots on: "Those look like good boots. When you get back to the lodge why don't you pack them with newspapers so they don't curl up and crack." When the boys finish cleaning up the site, Jess scans the ground for anything they might have missed. "If I find it, will you eat it?" he laughs.

In his years as a leader, Jess has encountered his share of problems. He has had to deal with boys who had drug problems, boys from troubled homes who have tried to adopt him as a kind of surrogate father ("I have to tell them, 'I'm not your dad, I'm just your Scoutmaster' "). He has been a part of the troop during two decades that have tested the organization severely. With the nation's birthrate declining, membership has shrunk, and in a time of single-parent families adult leaders have been difficult to recruit. High school sports, girls and cars have continued to lure away the older boys, and Little League and the tube have also worked their malefactions on the younger ones.

In the late 1960s, the Scouts came under heavy fire for being out of touch with the times. Although local Scout councils received as much as 60 percent of their budgets from United Way, the Scouts had barely penetrated the urban core and were criticized for subsidizing the recreation of middle-class boys from the suburbs. In an era of feminism, antimilitarism and the questioning of traditional values, the Scouts struck many as an anachronism: an unrepentantly all-male organization whose members wore quasimartial uniforms and went around proclaiming their fidelity to such broken idols as loyalty and patriotism—a kind of *Hitlerjugend* from the land of pools and patios.

Looking for instant "relevance"

In response, the Scouts went into kind of a spasm as they tried to achieve instant "relevance." They made a laudable attempt to attract minorities and to introduce Scouting, with modifications, to the inner city. The change of emphasis was most evident in the *Handbook for Boys,* the Scouting bible that had, with occasional updating, been seducing impressionable youngsters since 1910. If the old *Handbook* had in it the whiff of Huckleberry Finn, the new, relevant 1972

edition read as if it had been concocted by committee at a symposium on social and educational theory. Morse code and semaphore were gone, along with the sections on tracking, cloud identification and building a fire without matches. Instead, the book raised such issues as landlord violations of housing standards. Explanations of the points of the Scout Law took on dimensions of existential ambiguity. The section on loyalty posed the question: "But what if some friends take your sister's bike? They strip it and sell the parts. Where does your loyalty lie?" The first of a number of color plates about wild animals showed an urban setting populated by creatures hardly calculated to stir the imagination: the cockroach, the silverfish and the Norway rat. The sense of outdoor adventure, if not eliminated, was effectively buried. The problem with the new *Handbook* was not so much that it favored inner-city youths over those from the suburbs as that it was not apt to stir the blood of any youngster.

Between 1972 and 1979, membership plummeted from a high of almost five million boys—in all forms of Scouting—to just over three million. Relevance may have been all well and good, but clearly the organization had to return to its roots. Without abandoning their commitment to urban youths, Scouting executives decided to "put the outing back into Scouting."

What every young man should know

In 1979 they produced still another version of the *Handbook*. It deals with the kind of stuff that every young man should know, such as how to sharpen a knife (use a slicing motion, as if cutting into the stone), how to waterproof matches (paint them with Mom's nail polish) and how to keep from getting thirsty while hiking (put a small, clean pebble in your mouth). All the knots and lashings and splices are there, along with those old standbys, semaphore and Morse code. Modern sensibilities are evident—the section on great Americans includes Martin Luther King jr. and Chief Plenty Coups as well as Benjamin Franklin and Thomas Edison—but landlord violations and ambiguity are gone. Indeed, the new *Handbook* isn't radically different from the one I had in 1945.

And to my surprise, out at the old lodge, Troop 161 didn't seem that much different, either. As our Scoutmaster did, Jess generally stayed a step or two in the background: he left the running of things to his Senior Patrol Leader, 16-year-old Rich Schulz, whom the other boys call Tiger. A Star Scout with nine merit badges—"one of the hopefuls for Eagle," Jess says—he is five-foot-six and sturdy. He leads by doing—the others follow. He is the first one down the ravine, the first one up the hill. At hide-and-seek in the tall reeds

Jess Saba (left), Troop 161's Scoutmaster, plans camping activities with his assistant John Zigman jr.

by the river, he is the one who finds and is not found. He is the one who has to hold the snake. He also talks about girls, gives a little sass to the Scoutmaster and in camp plays rock tapes on a portable recorder. In short, if not precisely what Baden-Powell had in mind, an exemplary young man.

Troop 161 used to be a hiking and camping troop, and it still is. We took a night hike down the country roads, and the Scouts told stories of night-hike adventures that I remembered from years ago, almost word for word—the vicious dog story, the electric fence story and the one about the farmer and the shotgun loaded with rock salt. On Saturday we hiked down the dry creek to the Grand River. At the 70-foot falls, a series of steep slate ledges, Jess rigged up a rope and the boys went down, half-scrambling, half-rappelling. Tiger, of course, was first down the rope. Last was a middle-aged former member of the troop, who got a cheer from the Scouts when he reached bottom. (Later, the nagging pain of a pulled muscle seemed a small price to pay.) At the river, one of the boys turned over a rock and shouted "Snake!" Without hesitation the former Scout—whose sole merit badge had been in reptile study—deftly pinned the creature behind the head, held it up for all to see, and before releasing it delivered to a respectful audience a brief lecture on the life and times of *Regina septemvittata*, the queen snake.

Back at the lodge, the boys worked with the leaders on skill awards or merit badges. An assistant Scoutmaster briefed two on wilderness skills. "Do you know how many meals you can make out of a pine tree? You can make tea out the the needles, you can take off

At Tenth National Jamboree, thousands of Scouts from across the country assembled at closing ceremony.

the gummy bark and chew that up. Grasshoppers you can eat—no, I'm serious, they're good for you."

Meanwhile, at a table in the lodge, Tiger was explaining to some of the younger boys the intricacies of map and compass. With a road map spread out before them they plotted a compass course to Toledo. Out on the porch, another assistant Scoutmaster worked with an 11-year-old who was trying to earn his skill award for citizenship. "You respect your flag, you respect yourself, you respect your parents, and above all you respect your country, because that's where you live. Now let me hear you give the Pledge of Allegiance." The boy's response was hopelessly garbled. The Scoutmaster sighed and said gently, "Why don't you try that again later. You're doing pretty good, but just take your time and think about what you're saying."

Not far away, Jess drew one of the boys aside. Jason had been in the troop for six months, he had just reached the rank of Tenderfoot, and it was time for his "personal growth agreement conference"—a high-falutin name for a man-to-man talk. "Now you're looking toward Second Class Scout," Jess told him. "You'll learn how to sharpen a knife and an ax. You'll learn more about first aid. We know that back on our town turf a lot of kids laugh about Scouts. But we're proud to be Scouts. It is *the* best organization in the world for us. It teaches us responsibility, citizenship and a thing called character. Character is what you will be for the rest of your life." Jason, subdued and attentive, hung on every word. Jess said: "Now it's time for you to reach for that next rung on the ladder. Go for it!"

How many rungs Jason will climb on Scouting's ladder, or life's, only the future can tell, but one thing's certain: weekends like this one aren't going to hurt him. At night, after the campfire, 14-year-old Pete summed it up. "We eat good, we go camping a lot, we got modern equipment, modern people, we know what we're doing. We got sidekicks, funny people, jokes cracked when they're not supposed to be. We got good times, bad times, great leaders. It's the best."

Down at Boy Scout national headquarters in Irving, Texas, Ben Love thinks that Scouting will continue to be the best. Love, the 30-year career professional who was recently appointed Chief Scout Executive, says: "The pendulum has swung back to the middle." The effort to beef up Scouting in the cities will continue, and programs will adapt to changing times—but the emphasis will remain on traditional values and the outdoor experience. The Scouts have made small gains in membership in three of the past four years. A new Tiger Cubs program is aimed at seven-year-olds, and high-schoolers are joining Explorer posts—coed units that concentrate on learning about career fields. Love knows that the organization will never reach the number of youngsters that it reached years ago, but he does hope for membership increases of from one-half percent to one-and-a-half percent per year.

"A Scout is trustworthy, loyal, helpful, friendly, courteous, kind, obedient, cheerful, thrifty, brave, clean and reverent." Those are the words of the Scout Law, and looking at them now, I realize how far short of those standards I fell during my Scouting years, and how far short of them I fall today. I missed the mark that the men who created the Boy Scouts set for me; I guess that many of us did. The Scouts did not remake America, as its founders envisioned, nor can the Scouts take credit for creating a better world. Certainly all the Scouts did not become obedient or cheerful or thrifty or reverent. I suspect that more often than not what Scouting did was simply this: it nurtured a lasting affection for the outdoors and it helped us survive adolescence. And maybe that's enough.

The Indian-head neckerchief slide is yellowed now, partly from the years, partly from handling—like the bowl of a good pipe, it invites the touch. Not long ago I was thinking about the day I won it, and about the redheaded boy whose prize it would have been except for his indiscretion. I recalled my mixed feelings of pleasure and guilt, and wondered, for a moment, what I would have done if he had approached me and asked me for what was rightfully his.

He would have had to fight me for it.

During his Scouting days, Joseph Lee prospected for Oregon gold, then inspected his find with a magnifier.

THE RACE FOR A UNIVERSAL OFFICE SYSTEM

The sales pitch goes like this: In the "Office of the Future" everything will work together — computers, telephones, word processors, the works. The new *integrated* systems, they say, will even turn out the lights when you go home.

Behind these seductive promises are some of the most capable companies in America: IBM, Wang, AT&T, and a host of scrappy newcomers.

Each has established a beachhead in the "Battle of the Desk Top." Each aims to extend its reach into more of your office. And that is why so many business people have cried "Whoa!"

Too often, "systems integration" turns out to mean buying more of a

continued on next page

continued from preceding page

particular vendor's products. At the core of some proposals is an open-ended commitment to a single supplier.

Few customers are eager to make such a marriage. Most are still sorting out the office of the present; they want to integrate the systems they already have.

Says one technology-watcher: "Customers are used to going to different vendors for different needs. Now they're being asked to buy everything from everybody."

Enter AT&T Information Systems with an unusual perspective: AT&T itself is among the largest *users* of computers and communications gear in the world.

We know what can go right – and what can go wrong. It is this *experience* that is at the heart of the systems integration plan we now offer to our own business customers.

◇

SHOTGUN. AT&T Information Systems believes that an integrated office system shouldn't involve junking products you already own. Nor a shotgun wedding with a single supplier.

As customers ourselves, we have a huge investment in our existing office systems. So we have created a systems architecture that defines "integration" as making things work together – whether they're old or new, our own or somebody else's.

Item: Your office telephone system can do double and triple duty as a highway for data – supporting computer traffic, monitoring energy use and security functions.

Item: Word-processing terminals can link up with other devices in a company-wide message system.

Item: Your isolated PCs can now be "networked" to share data and peripherals, and to communicate with larger computers. (Our own, and Brand X.)

The fabric that supports such an array of components is a set of design rules, protocols, and other specifications developed by AT&T, and known collectively as Information Systems Architecture.

Information Systems Architecture is not a product; it is a plan.

It defines the way the pieces of a system fit together, and the role that the whole system plays in a particular office. It does not dictate whose machines to buy – or when.

Like your company's organization chart, it outlines the relationships between "departments," but does not create policy itself.

◇

WHO'S WHO. A couple of months ago, we showed this ad to some technical experts from outside AT&T. "Where's the beef?" they asked. "Whose gear can you tie together *exactly?*" they asked. "How well *exactly?* What next... *exactly?*"

The kind of detail our technical friends had in mind would leave the average reader numb. The items that follow are rated G – suitable for the

An integrated office system shouldn't have to mean junking products you already own. Nor a shotgun wedding with a single supplier.

© 1985 AT&T Information Systems

No vendor in this market can be all things to all people. Somebody has to be the Integrator. That's our Ace. We know how to make the pieces fit.

general business audience:

Open house. For a token $500, AT&T will show any competitor how to link their products with our digital switching systems. (*PBX*s, to the trade.) The names in our guest book read like a vendor's *Who's Who*: Wang, Mitel, Hewlett-Packard, Prime, Data General, NEC and *40* others.

Result: a better fit between their office automation gear and our PBXs...and thus better communication between the products of warring vendors. In your office, at least, they become allies.

This "instant network" welcomes change. New terminals click right in to little outlets that look suspiciously like your phone jacks at home. Pinch, click! and your people are off to the races. They can share data, mail each other electronic valentines, make more money for the firm.

Good news for IBM customers. A number of companies have found that an AT&T environment can enhance the usefulness of IBM equipment by serving as a "bridge" between Big Blue and the rest of the business world.

Folding IBM's unique system into a more open, more universal scheme is a tall order. Today's customer must install special "black boxes" to act as intermediaries.

We can't say what IBM's troops are up to, but many of AT&T's best and brightest are working nights to make the AT&T-IBM connection simpler, cheaper, and more complete. We will keep you posted on our progress.

AVALANCHE. On a typical business day, the assembly lines and "clean rooms" of AT&T will roll out thousands of computers, PBXs, printers, modems, terminals, networks and software.

In 1984 we launched 100 new products, twice as many as the year before. Despite this avalanche of systems, it is our belief that no vendor in this market can be all things to all people.

Somebody has to be the Integrator. That's our Ace. We know how to make the pieces fit.

In AT&T Information Systems Architecture, we now have the means to integrate office machines from many sources – ourselves and others, new or installed — into a single system.

A *system of systems* that fits each customer's particular business needs.

To learn how Information Systems Architecture applies to your company's present and future plans, please telephone 1-800-247-1212. Or write Mr. Dale Hegstrom, AT&T Information Systems. P.O. Box 1405, Morristown, NJ 07960-1405.

AT&T

The right choice.

By James S. Trefil

Concentric clues from growth rings unlock the past

Trees remember, and scientists are learning to ask them about everything from historical dates to earthquakes and volcanic eruptions

Pueblo dwellings in New Mexico, a 17th-century oil painting and the streets of a medieval Russian city may seem to have little in common, but all are being connected by a new—and unexpected—field of scientific research. That field is the study of the annual growth rings of trees. Tree rings were once of serious concern only to woodcarvers and cabinetmakers, but a combination of individual genius, sophisticated analysis and old-fashioned luck have turned them into tools that can be applied in areas as diverse as anthropology and pollution control.

Carpenters from time immemorial must have known that tree trunks have rings, which give rise to the grain in a piece of wood. We find them mentioned by associates of Aristotle, but Leonardo da Vinci was the first person to suggest that as trees grow, they add a new ring every year. Today, we understand that when spring arrives and vegetation comes alive after the dormancy of winter, the cells just inside the bark of a tree start to divide. They produce large, thin-walled cells that we see as the light-colored material scientists call earlywood. Later in the season, the growth slows down and the cells get smaller and thicker walled. This so-called latewood looks darker and is what makes up the dark rings in a tree trunk. After the latewood forms, the tree becomes dormant again for the winter and the whole cycle repeats. The result is that many species carry in their trunks a series of alternating dark and light bands, each pair corresponding to a year's growth. These contrasting bands are most evident in conifers; distinctions between rings are not as pronounced in most temperate deciduous species and are absent in many tropical trees.

Trees are living archives, carrying within their structure a record not only of their age but also of precipitation and temperature for each year in which a ring was formed. The record might also include the marks of forest fires, early frosts and, incorporated into the wood itself, chemical elements the tree removed from its environment. Thus, if we only knew how to unlock its secrets, a tree could tell us a great deal about what was happening in its neighborhood from the time of its beginning. Trees can tell us what was happening before written records became available. They also have a great deal to tell us about our future. The records of past climate that they contain can help us to understand the natural forces that produce our weather, and this, in turn, can help us plan.

Application of the study of tree rings began in the early part of this century with Andrew Ellicott Douglass. Born in Vermont in 1867, Douglass went to Arizona to find a location for a new observatory to be built by his fellow New Englander, Percival Lowell. Beginning in 1901, Douglass made a practice of traveling out to logging camps near Flagstaff to examine the ring patterns in freshly cut tree stumps. He was looking for evidence that the 11-year cycle of sunspots had been recorded in these rings. He didn't immediately find what he was looking for, but he did notice that the tree rings appeared to show the same patterns from one area to another. For example, if freshly cut trees in one logging camp had three wide outer rings preceded by two thin ones, the same pattern would be evident in trees cut down in other camps. One could then reason that this pattern indicated two years with bad conditions, followed by three good years. Douglass noticed that the patterns he found seemed to occur throughout northern Arizona.

Matching sequences from tree to tree

During the first two decades of this century, Douglass continued to study the patterns in tree rings. The technique he used, now known as cross-dating, was based on a simple idea. Suppose you found a particular sequence of growth rings: for example, fat, skinny, fat, fat, skinny, skinny, fat. Suppose further that you found this sequence near the center of a tree that was cut down last winter. You know the outermost ring in the tree was formed in 1984 so, by counting backward

Decades of good and not-so-good years are revealed in this cross section of Douglas fir from the Southwest.

Color photographs by Terrence Moore

William Robinson, coring, directs the Laboratory of Tree-Ring Research at the University of Arizona.

Dressed properly for the occasion, Andrew Ellicott Douglass cores a tree in Arizona, about 1929.

along the rings until you come to the sequence, you could figure out when it started. For the sake of argument, let's say that the initial fat ring in our sequence was formed 100 years ago, in 1885.

Now suppose we find the same sequence in the outer rings of an old tree that died long ago. Because we don't know the exact date of the tree's death, we can't just count backward from the outside. We know when our sample sequence started, however, so we can assign a date (in this case 1885) to the first outer ring that matches the similar ring on our initial sample. We could then count inward and establish the approximate year the tree began and count outward to establish the exact year it died (assuming the outer rings are still intact). In the hands of tree-ring scientists, both of these pieces of information are valuable. The pattern in the rings back to the starting date can, with luck, be matched to that in still older trees, extending our knowledge of these patterns further back in time. In this way people working with living and dead bristlecone pines have managed to construct a continuous record of tree rings back to about the year 6700 B.C. At the other end of the scale, the date of the tree's death may be very important if the tree was cut down to be incorporated into a structure, for then the rings allow us to assign a fairly accurate date to the building.

As it happens, reading tree rings to date old structures was the first use to which Douglass put his new knowledge. The pueblo ruins of the American Southwest had long excited the interest of archaeologists. Built by skillful craftsmen, many of them had obviously been occupied for centuries and then, for

reasons unknown, they were abandoned. Dates for the pueblos as early as 2000 B.C. were proposed. Starting in 1916, Douglass began examining wood samples from pueblo ruins, looking at the ring patterns to establish their dates. By 1929 he had succeeded in putting together a relative, or "floating," chronology. He was able to match up ring patterns among various logs in the pueblos, allowing him to say which were early and which late, but none of the pueblo patterns could be assigned calendar dates, as none matched up with those from dated trees. By this time the tree-ring chronology for northern Arizona had been extended back to A.D. 1260, so archaeologists could say that the pueblos were older than that, but nothing more. A gap of unknown length existed between the oldest dated tree ring and the youngest pueblo log.

Then, in 1929, on the third "Beam Expedition," when the archaeologists were getting so desperate they offered a $5 bonus to anyone who found a log with 100 or more rings in it, a laborer uncovered the end of a burned log buried in the ground (p. 50). Douglass quickly recognized the pattern in the outer rings of the log as matching the oldest part of the known tree-ring calendar, and the pattern on the inner part of the log as matching the most recent part of his floating chronology. This single discovery, then, spanned the gap between the known and unknown, proving that the pueblos were inhabited anywhere from the tenth to 13th centuries A.D. before being abandoned.

Following the discovery of the "Rosetta stone" log, the chronology of Pueblo Indian remains throughout the Southwest was quickly worked out. In the wake of this success, Douglass founded the Laboratory of Tree-Ring Research at the University of Arizona, at Tucson, in 1937. The laboratory remains to this day the major world center for this kind of work.

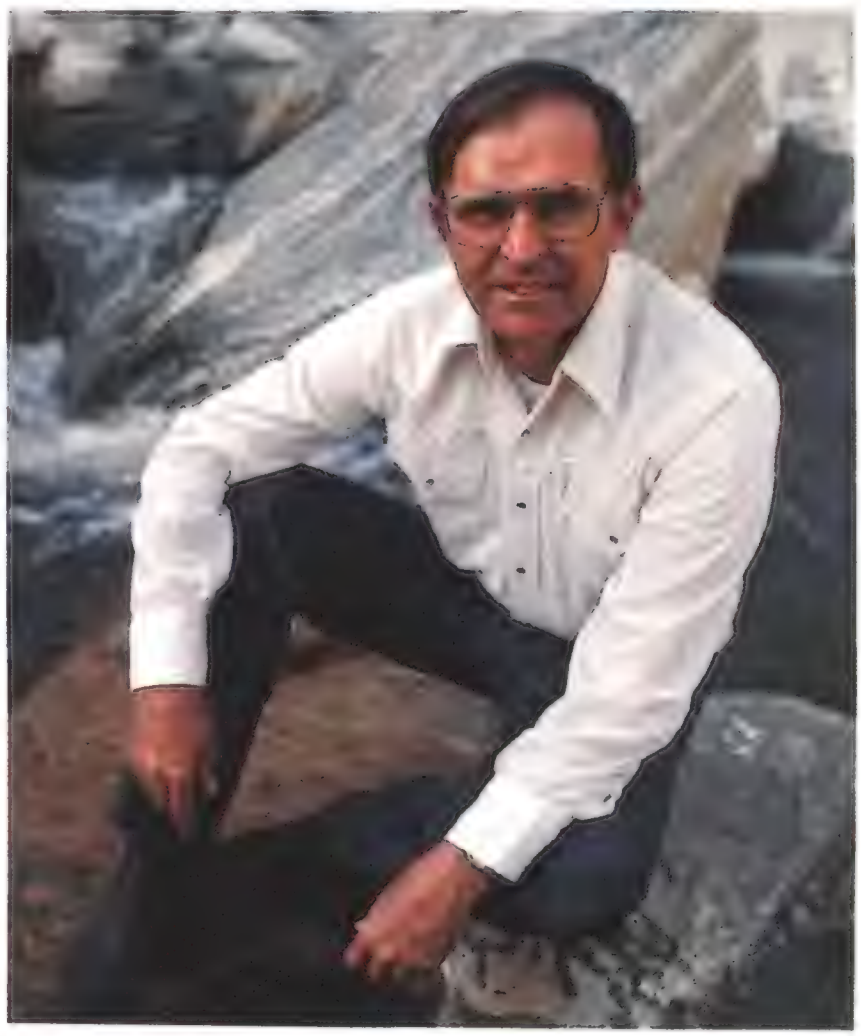
Complacent trees are harder to read

Once the usefulness of tree rings had been proved in the Southwest, scientists elsewhere decided to take the methods seriously. It was really a matter of luck that Douglass started his studies in Arizona, where conditions for the growth of trees are often far from ideal. In such a situation, small drops in precipitation or temperature can result in drastically reduced growth for the tree and, consequently, a visibly narrow ring for that year.

In other areas, such as the eastern United States and Europe, tree-ring analysts face a different set of problems. In 1975, with the support of the Climate Dynamics Program of the National Science Foundation, Gordon Jacoby of Columbia University's Lamont-Doherty Geological Observatory founded a tree-ring laboratory that has become a major center for the study of East Coast and northern forests. "Trees in Eastern forests are closer to each other than in the Southwest," he pointed out. "This means that competition between trees is more important here, and this can have a marked effect on the ring growth of an individual tree. Also, in the East the trees are less limited by climate, so there is less variation between rings as the weather changes." In the language of tree-ring scientists, many East Coast trees tend to be less "sensitive," and thus show "complacent" growth.

So great did these difficulties seem in 1975 that, according to Jacoby, some experts despaired of ever establishing reliable tree-ring chronologies in the East. But, since then, many of these difficulties have been overcome, and now chronologies exist for many locations that used to be blanks on the map. Unlike some of their counterparts in the West, however, these chronologies extend back only 300 to 500 years. The oldest trees in the Northeast (hemlocks) do not get much older than that, and trees that die tend to rot in the moister climate, so that their rings are lost quickly.

In places with a long record of advanced civilizations, the use of tree rings can be unexpected and dramatic. For example, the citizens of medieval Novgorod (in northwestern Russia) dealt with the mud in their streets by putting down layers of logs. As each



Hydrologist Charles Stockton uses tree-ring analysis to study variations in water supply over the centuries.

layer sank into the mire, it was replaced, until today there are no fewer than 28 streets stacked on top of each other, dating from A.D. 953 to 1462: a tree-ring paradise. In another case, paintings by such Dutch masters as Rembrandt and Rubens were dated by an analysis of the ring patterns in the oak panels backing the paintings.

But if the use of rings to date archaeological objects was the major task in the first half of this century, the analysis of information about past climates and chemical contents of the atmosphere is fast overtaking it in the 1980s. Perhaps nothing illustrates this application of new sorts of science to the tree ring so well as the ongoing calibration of the carbon-14 dating system.

With Methuselah's help, a 9,000-year record

Bristlecone pines are the oldest living tree. They are found in six states in the Southwest. Gnarled, twisted, stunted, they do not have the grandeur that you might expect to find in an ancient tree, yet the oldest of them, the Methuselah tree, has been adding rings to its trunk for more than 4,600 years. Moreover, in the dry climate of the mountains in which they are found, dead trees remain standing for long periods of time, and even when they fall they do not quickly decay. Using cross-dating between live and dead wood, it is possible to construct a continuous record of tree rings going back almost 9,000 years.

Most of the carbon in living tissues (including your own) is the plain, garden-variety stuff called carbon 12 (the 12 indicates that there is a total of 12 neutrons and protons in the carbon nucleus). Cosmic rays colliding with atoms in the upper atmosphere, however, occasionally produce a mutant version known as carbon 14, which has two additional neutrons in its nucleus. Carbon 14 has the same chemical interactions as ordinary carbon, so a small percentage of the carbon in living tissue will be of this type, with the exact percentage depending on how much carbon 14 is being created at any given time. As soon as the carbon 14 is incorporated, the mutant nuclei begin to decay. The idea is that plants and animals stop adding carbon to their systems when they die, so that from that point on no new carbon 14 is added and the old atoms start to disappear. Provided we know how many carbon-14 atoms were in the environment, then, counting the number left will tell us how much time has elapsed since the organism died.

When this dating scheme was originally proposed, it was assumed that the amount of carbon 14 in the air was always the same as it is today. Based on this assumption, all sorts of organic remains were dated and carbon-14 content became a major tool in archaeology. By the early 1960s, however, problems were develop-

Series of lobes along the top of 164-year-old cross section is result of repeated fire damage, 1837-1904.

Worker secures "Rosetta stone" beam in pueblo ruins. Twine wrapping keeps fragile wood in one piece.

Archaeologist Jeffrey Dean takes a core from ancient beam in Navajo National Monument in Arizona.

Unscathed remainder of the trunk grew "normally" until tree was cut after formation of the 1981 ring.

ing with the oldest materials analyzed, which dated well into the B.C. era. Carbon-14 dates and dates obtained from historical documents differed, often by hundreds of years.

This was the situation in the late 1960s when C. W. Ferguson at the University of Arizona began attacking the discrepancy with the use of data from bristlecone pines. The idea was that we know the exact year in which the wood in a particular ring was formed, so counting carbon-14 atoms in that ring will tell us how many such atoms there were in the wood at the beginning. It was seen very quickly that the amount of carbon 14 in the atmosphere in the past was not the same as it is today, contrary to the original assumption. More carbon 14 was being created in the past than there is now, so all the original carbon-14 dates had to be moved back. The dates for the three different periods of construction at Stonehenge, for example, have been changed by several hundred years.

What tree rings tell us about climate

All the uses of tree rings we have discussed so far in this article generally go under the name of dendrochronology (from the Greek *dendron*: tree, and *khronos*: time). The hot topic in tree-ring research these days is the field of dendroclimatology: the reconstruction of past climates and climatic events from evidence found in tree rings.

This sort of work is much more complicated than dating, because it depends on the differences in widths between rings grown in different years. Given the inherent variability between trees and even within the rings of a single tree, it's much easier to say with certainty that one ring was five years older than another than to assign a precise number to the difference in width between them.

The modern study of dendroclimatology could be said to have been born with the work of biologist Harold Fritts (p. 54) at the University of Arizona in the 1960s. Fritts and his colleagues monitored the growth processes of a small number of trees near Tucson in great detail, covering branches and often entire trees with plastic to determine how much of each atmospheric gas the tree took in and gave off. After a decade of work, they came to a detailed understanding of the processes that lead to the creation of a single ring on a tree.

The growth of a tree ring isn't as simple as it might appear at first. If last year was a particularly good one for tree growth, for example, the root system of the tree might have expanded more than usual, and this will carry over into this year's growth. Similarly, a bad year might slow down the growth for several years in the future, regardless of the weather in those years.

Patterns of narrow and fat rings allow a tree to be cross-dated with others. Pointer shows year of drought.

Sorting out all these effects for a system as complex as a living tree was a monumental task, but once it was done the results had as wide a variety of uses as did the establishing of chronologies.

By gathering data from tree rings around the southwestern United States and comparing this with the weather records of the past 100 years, for example, we can see how the tree rings reflect the climate. Then, going back into the period when there was no weather information recorded, we can deduce what the weather must have been when each particular ring was formed. In this way, Fritts has developed climate maps of the western United States and the northern Pacific (where western weather originates) back to about A.D. 1600.

At first glance, such an exercise might seem academic: Who cares whether 1678 was dry or wet? But Charles Stockton (p. 49), a hydrologist who uses tree-ring analysis to study water supplies, pointed out that this attitude misses an important point. "When we looked at the precipitation data for a period of years, we could see the areas of drought grow and shrink periodically." This visual impression was quickly reinforced by computer studies that showed clear evidence for cyclical droughts in the western United States. The question that concerns dendroclimatologists right now is whether or not the droughts occur in a 22-year cycle, a 19-year cycle or (most likely) some combination of the two. With a tree-ring-derived rainfall record going back more than 300 years, however, they expect to sort out the drought cycle by 1986.

Tree-ring specialists are also getting involved in studying the effects of acid rain on eastern forests. "This is a serious problem," says Columbia's Gordon Jacoby, "but it's an area where we have to be very careful. First we have to establish what is actually happening to the trees, and only then will we be able to think about causal relations."

Jacoby explained that as trees grow older, the rings become narrower. This means that it would be very easy to look at a core, see that the rings were getting narrower and conclude that the tree was being adversely affected by acid rain—when the real reason for the narrow rings was the normal aging process. One must also make comparisons with climatic data to rule out other possible causes of growth decline. To find evidence for the effects of acid rain, you have to find retarded growth beyond what you would expect to see in the normal course of affairs. Jacoby does, indeed, see this sort of effect in three of a dozen sites he has sampled around New England, but it is absent in the remaining nine.

In some situations, however, tree rings can be used to document the effects of pollution in a very dramatic way. A group from the University of Arizona, for example, was able to see the effects of a lead smelter in Trail, British Columbia, on tree growth in Washington State. The growth was well below normal when the smelter was turned on, but then rebounded when the smelter was shut down a few years later.

Tree rings also record the explosive eruptions of large volcanoes. When an event like Mount St. Helens happens, large amounts of ash and gases are thrown into the stratosphere (SMITHSONIAN, July 1980). There the dust and gases block out parts of the sunlight that would normally reach the surface. This can lead to

Author James Trefil is a physicist at the University of Virginia. His latest book, Space, Time, Infinity, *was published last month by Smithsonian Books.*

THE ONLY "ULTRA DELUXE" VOYAGES TO SOUTH AMERICA, CARIBBEAN, PANAMA CANAL.

2 OR 3 GLORIOUS WEEKS ON SAGAFJORD OR VISTAFJORD PLUS FREE AIRFARE

If you're seeking balmy climes, interesting places and more than a little luxury this fall or winter, Sagafjord or Vistafjord are for you. These ships were both recently rated as "ultra deluxe" by the renowned World Ocean and Cruise News. This lofty accolade was earned for impeccable personalized service, unhurried single-seating dining and enviable cuisine, luxurious accommodations and lively entertainment and activities.

South America and Concorde

Visit this dazzling continent. Discover the sophisticated "Great Cities" of South America, such as Buenos Aires, Montevideo, Rio, Recife—plus not-to-be-missed Caribbean ports—in November, December or March. This fall, fly one way between Rio and NY/Miami on specially reserved Concorde flights for only $995 more.

Connoisseur's Caribbean

The beauty of the sun-drenched Caribbean islands is breathtaking. There are several two-week cruises to the Caribbean's most exotic spots. Sail from Ft. Lauderdale to Haiti, Guadeloupe/Iles des Saintes, Barbados, Grenada, St. Barts, Grand Cayman, and many more, from December to March.

SAGAFJORD/VISTAFJORD SCHEDULE

Sept. 15	15 or 20 days	TransCanal
Oct. 5, 19	14 days	TransCanal
Nov. 2*	21 days	South America
Dec. 7*	14 days	South America
Dec. 7	6 or 12 days	Caribbean
Dec. 19	16 days	TransCanal
Dec. 21	15 days	Caribbean
Jan. 6	14 days	TransCanal
Jan. 31	15 days	TransCanal
Feb. 15	14 days	Caribbean
Mar. 1	14 days	Caribbean
Mar. 15, 29	14 days	South America
Apr. 18	14 days	TransCanal

*Concorde available.

Panama Canal

One of man's most magnificent achievements. Select your own favorite itinerary, cruise length (14 to 20 days) on Sagafjord or Vistafjord, September to May. Transit the spectacular Panama Canal and visit Acapulco, Cozumel, Cartagena, Aruba, others.

Convenient weekend departures, free airfare

Most sailings are scheduled for your convenience on a Saturday or Sunday. Free roundtrip airfare is provided between departure ports and 71 gateway cities. Concorde option to Rio this fall, $995 additional.

See your travel agent—or mail coupon.

Sagafjord and Vistafjord registered in the Bahamas. Cunard/NAC reserves the right to cancel the Concorde program without prior notice.

Cunard/NAC
P.O. Box 999, Farmingdale, N.Y. 11737

Please send me information on Sagafjord and Vistafjord ultra deluxe voyages (Q740).

NAME

ADDRESS

CITY STATE ZIP

MY TRAVEL AGENT E17182

c Cunard 1985

CUNARD/NAC

QUEEN ELIZABETH 2 • SAGAFJORD • VISTAFJORD

Dendroclimatologist Harold Fritts uses data from tree rings to chart the historic variations in U.S. weather.

subfreezing temperatures and leave a characteristic mark called a frost ring on a growing tree. Valmore LaMarche and his coworkers at Arizona recently looked at frost rings in bristlecone pines and found that a number of them seemed to correspond to major volcanic eruptions. The explosion of Tambora in the East Indies, which gave rise to "the year without a summer" in 1816, left frost rings not only on the bristlecone pines, but on trees LaMarche studied in South Africa. One particularly severe set of frost rings occurred in 1626 B.C., and LaMarche suggests that the rings may have been caused by the destruction of the island of Thera (Santorini) in the Aegean Sea by a volcano. This eruption might have given rise to the legend of Atlantis sinking into the sea. LaMarche's date (still disputed by some archaeologists) is by far the most precise that has ever been proposed and agrees with available carbon-14 dates of artifacts that were caught in the eruption.

Another type of transient phenomenon that tree-ring scientists are starting to study seriously is earthquakes. These events can damage a tree by shaking it violently, and the damage can result in narrower rings in subsequent years as the tree heals. Gordon Jacoby of Columbia showed me a core from a ponderosa pine that had grown directly over the San Andreas fault in California. "This was a happy tree until 1857," he said, pointing to a spot where the several atypical narrow rings crowded together. In that year, a major earthquake rocked the Southern California countryside where the tree grew. "If you can rule out wind, fire, disease and climate as the source of this signal, you can use the tree to tell you when the fault was active in the past." With scientists at Caltech, he is starting a study of trees in the neighborhood of his happy pine tree to see if he can supply data from past events that would be useful to people trying to predict the occurrence of earthquakes.

All of these examples illustrate an important point. When we want to study the information stored in trees, we cannot restrict our attention to single geographical areas or even to single countries. The International Project In Dendroclimatology (IPID) is one effort to move tree-ring studies into the international arena. Scientists from many nations have pooled their information in an attempt to reconstruct past climates around the world. Their first goal seems a modest one, but it will be difficult to reach. The group, based in Arizona, wants to find the average yearly temperature in the Northern Hemisphere as far back in time as possible. At the moment, the analysis of the data is well under way.

If they reach their first goal, they might have an important impact on a problem of great public concern: the predicted global heating ("greenhouse effect") resulting from the increased concentrations of carbon dioxide in the atmosphere, an increase caused by the burning of coal and oil during the past few centuries. The IPID data will extend back to A.D. 1700, well before the beginning of the Industrial Revolution, when this burning started. "Without this sort of data base," said LaMarche, "atmospheric scientists may have to monitor temperatures and carbon dioxide for another ten to 20 years before they see unmistakable evidence of warming trends. By then, it may be too late to do anything about it."

The practical significance of such research emphasizes the need for an international effort in tree-ring work. One scientist after another at the Laboratory of Tree-Ring Research talked of "blank spots on the map," and all mentioned that the laboratory brings in foreign scientists for training, then sends them out to set up programs around the world. Perhaps someday we will be able to put together worldwide weather maps based on dendroclimatology similar to those that now exist for the western United States. If so, we will have added important data that is needed to understand how our climate and the living systems that depend on it interact.

Trees remember, and if we are clever enough, we can tap that memory to give us all sorts of useful knowledge about our past—and our future.

Bristlecone pines accumulate growth rings for thousands of years, are history books for scientists.

Like our ads, seem to go

The NON-STOP *small business printers.*

A simple printer failure can be the downfall of a small business.

No invoices. No computer generated letters. No labels, proposals or reports. And no printer in the next office to pick up the slack.

That's why most small business people rank reliability as the number one priority in a printer. And that's why more businesses of all sizes use Epson® printers than any other printer in the world.

YEARS AHEAD OF THE
COMPETITION

While most other printers only offer standard 90 day warranties, we stand behind Epson printers for a full year. And we've been doing it longer than most printer companies have been in business. Of course the warranty is one benefit of owning Epson printers that very few people have ever had the opportunity to take advantage of.

Is it an Epson ????? OR ????? Isn't it an Epson?

For over a decade, major computer companies have staked their own reputations on the reliability of Epson, by coming to us for the printers they sell with *their* computer systems.

Epson dot matrix printers have very graphic advantages. Besides the versatility of draft and near letter quality and the corresponding speed options, they can draw some very convincing pictures, including true circles.

INCOMPATIBILITY: *the irreconcilable difference.*

Software drives your computer. Software also drives your printer. And it's possible that your computer software will not be compatible with your printer.

This can be shocking when the p's on your monitor come out as q's on your printer.

But Epson printers are the standard to which virtually all major computer software is written. So whether it's IBM® or the newest name on the market, you can use your Epson printer with almost any hardware/software combination.

Epson printers on *forever...*

HARD COPY DECISIONS MADE EASY.

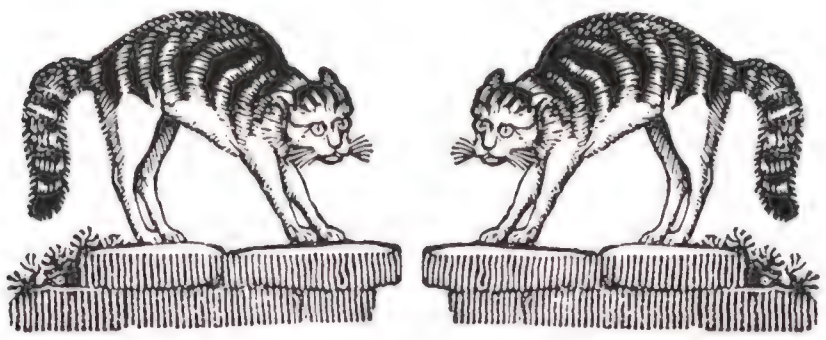
Depending on what you print, how much you print, and how much you want to invest, you'll find the right small business printer right here.

"So the question is: 'Which Epson?'"

For Starters. You're a small business just starting to use computers. Well, just because you don't want to invest a lot doesn't mean you have to settle for less than you need. The new low cost *Spectrum™ LX-80* operates at 100 characters per second in draft mode, prints near-letter-quality text, has 160 typestyles and has a full range of expansion options. Backed by the same full year warranty as our more expensive printers, it's built to work just as hard.

The New Standard. The Epson FX series has again set new standards as the workhorses of the industry. With print speeds of 160 characters per second in draft mode, easy access to near-letter-quality, a 20% increase in throughput, and excellent graphics, they're the number one selling printers from the number one printer company. For spreadsheets and financial reports, there's a wide carriage model.

The Complete Printer. For speed, quality and versatility, there isn't a better choice than the new *LQ-1500*. Its type rivals that of an office typewriter, at four times the speed of the average daisywheel printer. In draft mode it flies at 200 characters per second. And its graphics are among the highest resolution of all dot matrix printers.



Recently in Martinez, California, two cats knocked an FX-80 printer 4 feet onto a tile/concrete floor. Although it didn't land on it's feet, it is still running.

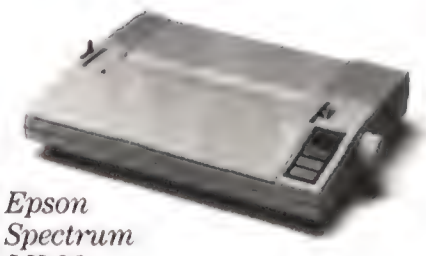
ONLY EPSON PRINTERS COULD GENERATE PRINT LIKE THIS

"Thank you for making such a rugged yet so fantastic piece of hardware."
L.F.G., Martinez, CA

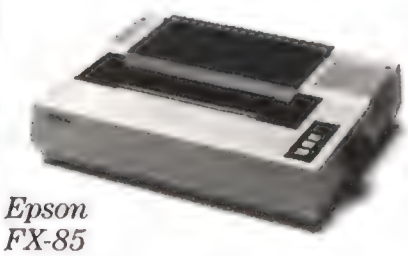
"...a relief in this industry often faulted by products designed to last about ninety days."
John Cameron, Medical Director, Raleigh Hills Hospital

"I have had my Epson FX-80+ about six weeks... my only regret is that I didn't replace my old printer a year ago."
L.A.R., 29 Palms, CA

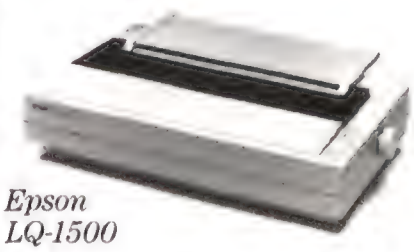
·SMALL· BUSINESS OPPORTUNITIES.



Epson Spectrum LX-80



Epson FX-85



Epson LQ-1500

EPSON

Number One.
And built like it.

Epson is a registered trademark of Epson Corporation
Spectrum is a trademark of Epson America, Inc. IBM is a registered trademark of International Business Machines

Kensett posed for the camera in his New York studio, about 1867. On easel is a Rhode Island landscape.

Wellesley College Museum of Art

The White Mountains—From North Conway, 1851, shows Kensett's mastery of the idyllic. It could be Eden.

By Don Lessem

John F. Kensett's gentle vision of the American land

A glowingly evocative show, the first major review in more than a century, brings back the harmony of a 19th-century master

"Nice guys finish last," said baseball savant Leo Durocher, not even thinking of John Frederick Kensett. Not thinking of Kensett, one of 19th-century America's most talented painters and kindest souls, has been the way of the art world for nearly a century. The last major comprehensive exhibition of Kensett's work was a memorial display in 1873, just a year after his untimely death.

Yet in his day, this cheerful, modest man was one of this nation's most celebrated and well-paid artists. He was a friend to Thackeray and Longfellow, a founder of New York's Metropolitan Museum of Art and a driving creative force in two of the most important developments in American art—the Hudson River School and luminism. When the prolific Kensett died in 1872, at age 56, the more than 600 works found in his New York studio were auctioned for the then staggering sum of $136,000, some going as high as $1,600.

Collection of Mr. and Mrs. Maurice N. Katz

The Shrine—A Scene in Italy was painted in Rome in 1847. It was shown in New York the following year.

The same gentle land- and seascapes, excepting those languishing in museum basements, could be purchased for mere hundreds of dollars just two decades ago. John K. Howat, now chairman of the Departments of American Art at the Metropolitan and one of Kensett's few outspoken admirers in the 1960s (he organized an important traveling exhibit of Kensett's paintings in 1968) bought a Kensett seascape for $150 in 1965.

Today Kensett's works once again bear princely price tags: one of his seascapes was auctioned for $594,000 in 1983. But even in comparison with his long-neglected, and now celebrated, contemporaries, Kensett's posthumous glory has been late in coming.

Kensett's genius and its popular neglect were very much on the minds of two of his other devotees in 1981, art historian John Paul Driscoll and the Worcester Art Museum's Curator of American Art, Susan E. Strickler, as they stood before that museum's only Kensett, a bucolic scene of Conway Valley, New Hampshire. "There's an artist who hasn't had his due," said Strickler, with more than idle interest.

Now, four years later, Driscoll and Strickler (with the support of the Worcester Art Museum, the Norton Company and the National Endowment for the Arts) have given Kensett his just due—a splendid exhibition of 45 paintings and 25 drawings. After its Worcester opening, "John Frederick Kensett: An American Master (1816-1872)" will be on view at the Los Angeles County Museum of Art from July 11 to September 8, going on to Kensett's beloved Metropolitan, October 29 to January 19, 1986. The show is enhanced by a hefty catalog, the first major monograph on the artist.

Together at last, the major works of Kensett reveal

Private collection

Shrewsbury River, 1860, is one of five views Kensett painted of that river as it empties into the Atlantic.

the hand of a master of muted colors, rich brushwork and glowing light, and the spirit of a man sublimely content with God and country. America to Kensett was "great nature's handiwork," the most singing example of "that beautiful harmony in which God has created the universe." That same fascination with the ennobling effects of nature informed all the works of the first indigenous American landscape painting movement. Named, pejoratively at first, for the favored locales of many of its adherents, this was the Hudson River School.

But unlike the school's founder, Thomas Cole, and his only pupil, Frederic Church, who reached far into the wilderness for their bold, often allegorical tableaux, Kensett mainly hugged the shores of the Hudson and his native New England coast. The sun shines on Kensett's civilized, if often unpeopled, landscapes. He painted that gentle country as he saw it, in "cool greens, greys, drabs and browns," always "harmonious and agreeable." In later years, as he turned his eye to the sea, his palette became filled with pastel tones,

Scenes were done in the Navesink Highlands of New Jersey and all display his love of color and light.

Collection of Jo Ann and Julian Ganz jr.

In *Forty Steps, Newport, Rhode Island,* Kensett has simplified his composition to land, sea and sky.

colors he used to imbue ambitious new works with soft light. This highly individual, almost abstract, direction is fully revealed for the first time in this exhibition by newly restored works from the "Last Summer's Work," the brief and highly productive period that preceded Kensett's death.

Like his fame and fortune, Kensett's artistic breakthroughs were not easily achieved. A slight, quiet youth, he grew up in the then farming country of Cheshire, Connecticut, not far north of New Haven. Though his great-grandfather Naphtali Daggett was a president of Yale, Kensett's circumstances were modest. His father was an engraver who early on encouraged his son's interest in graphic arts. At 13, he was apprenticed to Peter Maverick of New York City, the nation's leading commercial engraver. For Kensett this was the beginning of two decades of scratching out a living by engraving, executing artists' designs for bank notes and book frontispieces. He labored in New Haven, New York City and most unhappily of all in Albany, "eternally digging at maps and labels," according to his lifelong friend, painter John Casilear, whom he first met while both worked for Maverick in New York. Casilear offered insight into how the young men endured their drudgery in a letter to the 17-year-old Kensett: "I wish you was here that we might make merry over a good glass of whisky punch and a good cigar and talk over old times."

Unlucky in love as in labor, Kensett pined for a schoolmate of his sister, and even more acutely longed to paint. In June 1840, he sailed for Europe with painter Thomas Rossiter, a friend since boyhood, Casilear and Casilear's mentor Asher B. Durand. For Kensett it was a fortunate decision that linked him with Durand, the man who was to become the leader of the Hudson River School following the death of its founder, Thomas Cole.

For young Kensett, however, it was the genius of the Old Masters that first captured his imagination. In 1840, there were no great collections of European art in America and those first glimpses of the masterpieces of the Louvre had a profound effect on Kensett. The "rich color" of Titian impressed him, but the romantic, serene landscapes of French painter Claude Lorrain made the most lasting impact on him during his European sojourn, which lasted seven years.

For Kensett and his artist companions these were blithe years of penurious study and play: "the day being devoted to painting or engraving—the evening until 10 o.c. to drawing—French till 12½," Kensett wrote, perhaps overstating his diligence to impress an uncle who suspected him of dilatory ways. Certainly, Kensett was enjoying himself. He sorely regretted missing the gambols of the OMC, the Out of Money Club, to which his friends in Paris belonged while Kensett spent two years in England settling a legal tangle over his grandmother's estate. Without remorse he wrote to his brother, "I have long set myself down as a confirmed old bachelor, beyond the hope of re-

Century Association, New York

Commissioned by 19 members of the Century Association during the Civil War, *Mount Chocorua* has been interpreted as Kensett's affirmation of pride in the stability of a stricken Republic and its land.

demption—I am wedded to the arts and they must be my bride, and a more charming mistress I could not hope to win."

In his last European years, spent with painter friends Rossiter and Benjamin Champney in Rome, Kensett's art mistress began to reward him financially as well as esthetically. At first he had "not the wherewithal to buy a cheap breakfast," and as Champney recalled, "Kensett had already borrowed of his friend Rossiter, and felt delicate about asking for more." But the paintings Kensett produced in Rome, including a Claudian vision of nature's spiritual harmony—*The Shrine—A Scene in Italy* (p. 60)—earned him commissions, and the particular admiration of arts patron, transcendentalist and later *Harper's Weekly* editor, George Curtis.

Now well-regarded and well-connected, Kensett returned to New York to what Curtis called "a series of noiseless victories," including his election to the influential National Academy of Design. Kensett exhibited five paintings in the Academy's spring 1848 exhibition. His works were pronounced the best in the show by local critics and two of them, including *The Shrine*, sold.

That same year Cole died, and under Durand's leadership the Hudson River School painters turned toward a more faithful, less moralizing depiction of the American landscape. Durand urged artists to paint directly and accurately from nature. Kensett held with this view throughout his professional life, "carrying on a steady course of study from nature," as he put it, every summer until his death. In search of scenes to sketch and paint, he hiked in central Maine with Church, rode the B & O railroad from Baltimore to St. Louis, canoed up the Missouri to Montana with fur traders, and trekked through the Rockies with painters Sanford Robinson Gifford and Worthington Whittredge. By no means the born outdoorsman, Kensett grew ever plumper on his wintry diet of society banquets, and earned the facetious sobriquet of "Canvas Back Duck" from Champney after falling off a rock, paintbrushes in hand, into the Salmon Falls River on a sketching outing.

Kensett's immersion in nature and the works of Cole, Durand and Claude Lorrain are all evident in his first great landscape, the smooth and formally balanced *The White Mountains—From North Conway* (pp. 58-59), painted in 1851. Mount Washington looms, appropriately Presidential, over the peaceful town and pasturelands. Civilization and nature happily coexist

Writer Don Lessem lives in Harvard, Massachusetts, between artist Kensett's beloved New England coastline and Bash Bish Falls in the Berkshire Hills.

Metropolitan Museum of Art, New York, Bequest of Maria DeWitt Jesup

There is mystery and majesty in *Lake George*, 1869, one of the artist's largest paintings (44 by 66 inches). A major work, it was bought for $3,000 by Morris K. Jesup, the second highest sum Kensett ever received.

around a town where, as Champney imagined, looking at the painting, the "inhabitants are sober—pious—well disposed and have all gone to church. . . . Not even a bird dare sing." This conception of Man's civilizing influence on the environment struck a responsive chord in the era of Manifest Destiny and America's westward expansion. A Currier & Ives print of the painting widened its renown.

Kensett's work and genial nature had already won him admission to a prestigious new club of artists, writers and their patrons, the Century Association. At the Century, and the even more exclusive Sketch Club, Kensett embarked on an active social life, hobnobbing with Thackeray, Washington Irving and Durand.

Kensett did enjoy the good food and company his exalted status afforded him, but he more than earned those rewards with his charity and business acumen. Though he refused titular roles out of apparent modesty, he was president of the Artists' Fund Society, set up to aid families of deceased artists, and treasurer of a National Academy of Design building fund that quickly raised $100,000. President Buchanan named him one of three artist members of a commission supervising decoration of the new United States Capitol building in 1859. And Kensett spent long hours directing the efforts of the Art Committee for New York City's extravagant Metropolitan Fair, a Civil War-era display of American culture, the proceeds of which went to the United States Sanitary Commission, a forerunner of the American Red Cross. The fair's enormous success—attendance numbered in the hundreds of thousands—provided both the name and inspiration for the museum Kensett helped to organize and, as of one of 27 founding trustees, to operate.

In his personal affairs, Kensett was just as unstintingly generous with his time and money. His elegant Broadway studio became a regular stopping place for artists and art buyers, where Kensett often displayed the works of promising neophytes. He bought their works as well, paying the handsome sum of $1,200 for young Eastman Johnson's *Negro Life in the South.* And he frequently aided his hard-strapped friends, Rossiter chief among them.

Kensett's generosity was reciprocated by his fellow members of the Century Association, who commissioned him in 1864 to paint a scene of his own choosing for the munificent sum of $5,000. Kensett's result was *Mount Chocorua* (opposite), a reaffirmation of America's inherent harmony despite the Civil War, and a throwback in subject and formal arrangement of scenery to *The White Mountains,* painted more than a decade earlier. Kensett had long since moved on to new subjects and a sparer style of painting. Grand vistas like *Mount Chocorua* and *The White Moun-*

tains were never Kensett's principal interest in depicting the landscape. Though he had seen purple mountain majesties and Niagara's great cataracts close up, Kensett often chose to depict them in the far distance, concentrating on foreground small detail. He painted Bash Bish Falls in the Berkshires of Massachusetts several times—preferring not the monumental upper falls but the boulder-strewn path of the lower falls—with such verisimilitude that geologist Paul Shepherd jr. described those paintings as "the most extraordinary preoccupation with the surfaces of crystalline and granite rocks—perhaps in the history of painting."

Calmer waters and simpler scenes began to predominate in Kensett's work in a series of five paintings of the Shrewsbury River in New Jersey, painted after visiting the scene at Curtis' invitation in 1853. In making forms secondary to the color and texture of natural light these works stand among the earliest examples of an artistic direction that is now known as luminism.

Bolder colors and emptier coastal scenes surfaced in Kensett's paintings of the 1860s—paintings of the Massachusetts coast and the beaches of Newport, Rhode Island, where he spent many summers. When Kensett turned inland again for inspiration it was to the quiet grandeur of Lake George. He had first visited the site in 1853 and painted it three times before creating his masterful *Lake George* of 1869 (p. 63). By that time, he felt free to round off its islands and streamline its mountainous shores in search of a muted gray-green atmosphere of silent splendor. But it is less these graceful forms than the reflected light upon what Kensett called "that sheet of water" that distinguishes *Lake George*. His success in capturing the light is reflected in the painting's sale price of $3,000.

With the dawning of a new decade, the 1870s, Kensett appeared to be entering a new phase in his art. Dark clouds intruded on his 1870 views of Lake George and western Colorado. But in the summer of 1872, those skies broke for Kensett outside a small studio on Long Island Sound. On the appropriately named Contentment Island near Darien, Connecticut, he had recently purchased a cottage with his friend, amateur painter Vincent Colyer. In and around his island studio, Kensett produced close to 40 works during that last year of his life—all of which were donated after his death to the Metropolitan. These paintings, executed with quick strokes and a handsome range of rich colors, were immediately hailed as works of genius. And in such evocative scenes as *Sunset on the Sea* (below)—golden light playing upon shining waters devoid of figures or forms—the bold, modern, abstract flavor of Kensett's "Last Summer's Work" is still strong. Nice guys finish best, not last.

And Kensett was a nice guy to the finish. His seaside works of 1872 clearly portended further achievement and renown in the artist's vigorous mid-life. But on a chill day that November, Colyer's wife overturned her buggy attempting to cross a narrow causeway to

Metropolitan Museum of Art, New York, Gift of Thomas Kensett

Sunset on the Sea, 1872, is one of the masterpieces of Kensett's "Last Summer's Work"—an epic painting.

the island at high tide. Local residents refused to retrieve her body from the icy waters, but Kensett rushed to the scene and dived in, righting the buggy and carrying the lifeless Mrs. Colyer to the house. A few days later he developed pneumonia. On December 14, 1872, he died.

Kensett's funeral was a major public event. His silver-handled rosewood coffin was laid in state in the library of the National Academy of Design. His great and good friends Casilear, Colyer and Whittredge were among the pallbearers. Of the many heartfelt eulogies none was more stirring than Curtis': "One of the noblest, purest, gentlest and truest of men is lost to us. . . . The charm of his character so suffused his life and his works, that each illustrated the other; and through the deep serene repose, the soft silvery tranquility of his pictures, the beholder, unsuspecting, looked into a heart of depthless peace and love."

OF ALL THE GREAT RESORTS IN HAWAII, ONLY ON

It's magic. The moment when warm, friendly smiles, Aloha music and fresh flower leis welcome you aboard Hawaii's only floating resort, an American Hawaii cruise ship. If there's a better way to see, really see, Hawaii, we can't imagine it.

You'll sail from the white beaches of Oahu to all the exotic romance of Maui, Kauai, and Kona and Hilo on the Big Island of Hawaii.

An enchanting 7 days. On a tour or exploring on your own. Shopping, swimming, snorkeling and golf. Finding seclusion on a hidden beach. Discovering the majestic beauty of a tropical

TAKES YOU TO ALL THE GREAT RESORTS IN HAWAII.

waterfall. And aboard our ship, you'll indulge in the warm, casual, Aloha spirit of the Islands, with everything you'd wish for in a great resort.

Cruise fares aboard our S.S. Independence℠ or S.S. Constitution℠ start as low as $995 per person. And when you book our cruise, you'll fly to Honolulu and back for about half the regular fare.

Your cruise aboard one great resort begins the moment you talk to your travel agent, or call us at (800) 227-3666. Let the moment be now.

AMERICAN HAWAII CRUISES™

By David M. Schwartz

The fertile aphids: pests that beget with a vengeance

Reproducing in every way imaginable, these tiny insects are battling our sophisticated control techniques—and guess who's winning

DX Fenten was beside himself. The gardening columnist for Long Island's *Newsday* had made the mistake of publishing his number in the new telephone directory. He was beset with calls. Weekdays, weekends, mornings, nights, it didn't seem to matter. What did his callers want to know about? "Everything under the sun that grows and all the little things that you wish would not." Number one on the hit list: aphids. Fenten knew why. "If you've got one, you've got a hundred. Thousands." Then with a pained chuckle, "Millions, really."

Which is exactly the problem with these pesky little pear-shaped insects of the plant-sucking order Homoptera: they know how to multiply. Though no longer overwhelmed by calls, Fenten is still driven to despair by the pests. "You go into your greenhouse on Monday to look at the lettuce that was so beautiful on Saturday, and it's covered with more of these little green jobbies than you can . . . I was going to say 'shake a stick at,' but that's definitely not what you want to do! So, you spray a little something and come back on Tuesday to find relatives of the ones you killed on Monday working the tomato seedlings. Walk out to your rosebushes and—oh my God!—you've got the same situation out there."

As aphids suck nourishment from a plant stem they face downward, making it easier to spot predators.

Uniformly small, soft-bodied and superficially unremarkable, aphids—also called plant lice—are indeed expert at lousing up plants, but their real forte is making more aphids. Their reproductive potential is unmatched in the insect world, most of whose members are far from slouchy at the business of begetting. The temptation to compute the theoretical progeny of a single aphid ancestor has smitten mathematically-minded biologists for years. Thomas Henry Huxley, a contemporary of Darwin, may have been the first when he calculated that in ten generations one female could give rise to an aphid mass equal to the combined human bulk of the Chinese empire. For years, Huxley's example was quoted far and wide by others who had the temerity to declare it an underestimate but, more recently, the British aphidologist A. F. G. Dixon came up with the conservative figure of 600 billion aphids in nine generations—a biomass comparable to that of merely 10,000 humans. Anyway you count them, it's more aphids than you can . . . er, shake a stick at.

To come as close as they can to their mighty potential, aphids have "learned," in an evolutionary sense, nearly every trick in the book. Sexual reproduction and virgin birth, egg laying and live delivery—aphids do it all, and then some. They can read a changing environment like an instruction manual, and then respond to it with almost unlimited versatility because they have mastered the art of being in more than one place at a time. Their secret is cloning—the production from one female of genetically identical offspring through the development of unfertilized eggs, or parthenogenesis.

If it doesn't work one way—try another

Generalizations are dangerous when it comes to aphids, for although many of the 4,000 species are almost indistinguishable to the untrained eye, their complex life histories can take wildly divergent paths. Even within a single species, the pattern can pile layer upon layer of variability. A mind for computer planning helps in trying to follow the various routines that an aphid can throw into its life cycle in order to optimize its chances for success and sabotage those of interested predators, parasites or entomologists.

No truly "typical" aphid haunts our gardens and greenhouses, but many of the more familiar crop pests begin their annual cycle as shiny black eggs that overwinter in the sequestered crevices of a tree's bark. With the burst of spring, those that have survived the incessant gleanings of chickadees and creepers hatch into wingless female nymphs and make their way to the nearest leaf or tender shoot. After a few exploratory probes with its syringelike proboscis, a young aphid strikes the homopteran version of liquid gold—

Photographs by Dwight R. Kuhn

An adult female aphid emerges from her cast skin, a molting process repeated four times during growth.

A cluster of aphids covered with white, mealy wax blankets a plant stem, depriving it of nourishment.

sugar-rich sap coursing through the tree's phloem cells. Here, unless disturbed, the nymphs will take up a lifetime tenancy spent largely in probing and feeding positions like football linemen at scrimmage.

After several molts, the adult aphid, still wingless, will bear daughters who emerge feetfirst and kicking. Neither males nor eggs are involved; this is a live virgin birth. Each daughter is the genetic photocopy of her mother, and so, in an evolutionary sense, she is her mother. In the same sense, she is each of her sisters. And so it goes with aphids—virgin females cloning themselves through the generations—usually until the end of the cycle. But long before then, the plot thickens.

Even though they are all chips off the same old chromosome, aphid siblings don't necessarily look the same. After the final molt, some may have wings. And as the new generation in turn produces its own daughters, the proportion of winged offspring increases. As far as the aphids are concerned, it is a very convenient state of affairs, for once the early flush of spring begins to wane, the host tree produces less and less sap. Triggered by low fluid pressure in the phloem, the overcrowded, undernourished aphids take wing in search of a new menu and a new milieu. Usually, they find both in the succulent stems or leaves of herbaceous plants that have just begun their annual growth spurt.

On their new hosts, too, the hungry aphids get right down to business—sucking the nutrients out of plants and converting those nutrients into more clones. Again, the early generations tend to be wingless. The generation time can be frighteningly short—five or six days in some species. Parthenogenesis helps to keep things moving along because there's no need for such time-consuming frivolities as mate location, courtship

Woolly aphid nymph is covered with fluffy wax tufts; an enemy, lacewing fly larva, can mimic its appearance.

Aphid herd is protected by an ant, who strokes them to stimulate flow of their "honeydew" waste bounty.

or copulation. And parthenogenesis engenders another upward leap in reproductive efficiency called paedogenesis, whereby offspring start developing inside their parents even before those parents have shed their larval skins. Aphids aren't the only insects to have discovered these two ways of jumping the gun in the fertility marathon, but they have run off with all the trophies by moving the starting line completely: the embryos growing in their juvenile mothers already have a brood of daughters developing inside of them. By telescoping their generations, every expectant aphid mother is at the same time an expectant grandmother!

Through the summer, the abundance of granddaughters, great-granddaughters and so on, again leads to overpopulation. The tactile stimulation of crowding induces the development of winged offspring, many of whom take off for greener pastures. Aphid migrations can range a few feet or half a continent as the peewee travelers quite literally cast their fates to the wind. Traps rigged to airplanes have collected them in astronomical numbers a thousand feet above the ground. After migrating, her wing muscles in some species are no longer needed and they are promptly absorbed as nourishment as she applies herself solely to drinking and birthing.

Usually it is not until early autumn, when plant juices start slowing down, that an aphid's fancy turns to love—or, more accurately, sex. Enter males. Responding to shortened day length and lowered temperatures, virgin mothers bear offspring who develop wings and leave the fast-wilting greenery of field and farm to return to the trees which, conveniently, have begun moving their sap with renewed vigor in preparation for winter. Anatomically, this generation is slightly different from its forebears and it gives rise to sexual offspring, male and female. Entirely lacking mouthparts, the adult males are capable of doing only one thing, and that they do with a vengeance. Fleeting as the mating moment may be compared with the months of sexless reproduction, it results in stirring the gene pool and dishing out new hereditary combinations, a process crucial to maintaining variability and adaptability. The female then deposits the fertilized eggs on the tree. The circle is thus unbroken.

Sometimes. The circle can, in fact, be broken by disposing of the sexual part of the story. To understand how such an expurgated edition can come to pass, let us return to the DX Fenten greenhouse. Here the rigors of winter are magically tempered. Now the production of eggs that lie dormant for half a year may represent a significant waste of time. Ought not the adaptable mother aphid continue to put her eggs, so to speak, in the cloning basket? True, this sexless approach sacrifices genetic recombination, but in an artificial environment like a greenhouse, most natural enemies and climatic extremes are left behind, and so the need for diversity can be put on a back burner for a while. The aphid mother can always return to sex when conditions warrant. For now, on with the offspring! Hence, Fenten's despair and his jittery calls from similarly afflicted greenhouse guardians.

Aphids are extremely adaptable. Some develop wings and colonize new territory while wingless sisters cling to old turf. Some leave the woods for the fields,

Freelance writer David Schwartz is a frequent contributor to SMITHSONIAN. *He last wrote about Duncan Hines in the November 1984 issue.*

Biological pest control at its best starts off when a parasitic wasp (left) injects an egg into aphid's body.

The wasp larva turns the aphid body into a bloated mummy by slowly consuming it from the inside out.

but others remain treebound all year. Species that normally mate once per cycle may become parthenogenetic year-round in tropical climates. Even in the same area, complete and incomplete cycles coexist among siblings, the two merging with each other from time to time. It all adds up to a most enviable biological plasticity that enables aphids to make the best of Indian summers, early winters, migrations to warmer climes, and hitchhiked rides into greenhouses or the front foyer that houses my prized Schefflera plant.

Of course, life is not all roses (potatoes, cabbages, peaches, etc.) for aphids or they would have denuded the Earth and died of starvation long ago. A stiff rain can do them in by the billions. Fungal pathogens can clean them out. For parasites in search of a home, they are sitting ducks. And a healthy crop of predators has come to recognize them as juicy morsels.

The leechlike larvae of hover flies, for example, can ravage an aphid colony. Blind and legless, they inch their way across aphid-covered vegetation, stumbling upon their prey. Once contact has been made, the prowler spears its quarry's bulging belly, lifts the victim skyward and retracts its own head so that the hapless aphid sits like a cork in a bottle, its six twiggy legs and two antennae impotently churning the air. With gulping, pumping movements, the predator drains its prey of fluid. Horticulturally-minded observers cannot fail to see it as a fitting coup de grace.

Ladybird beetles, the hemispherical red-orange "ladybugs" of childhood rhyme, no doubt earned a good bit of their popularity at the expense of aphids. Their appetite for pest insects has been exploited by companies that collect them during their winter hibernation in the mountain canyons of California and ship them off to aphid-plagued gardeners. At the Minnesota Zoological Garden, botanical curator Steven Wachter employs as many as 50,000 ladybirds a month in the zoo's 1.5-acre Tropics House, home to 12,000 plants and several hundred Asian animals and, formerly, innumerable aphids. The beetles arrive packed into a small box and are broadcast about the building in gleeful handfuls. They get right to work at chomping away on aphids that would otherwise require costly, potentially harmful insecticides. Unfortunately, they do not breed easily in captivity and must be replenished frequently. But a month's supply of these eager aphid eaters costs Wachter only $15, which he considers to be one of the world's great bargains in pest control.

Practitioners of biological control, the use of natural enemies rather than pesticides, have often capitalized on the predilection of parasitic wasps for injecting their eggs into the bodies of other insects. Slow-moving and abundant, aphids are the perfect target. Unfazed at first, the victim soon finds itself the living larder for a wasp larva that consumes it from the inside out. Ultimately, the ungracious guest will turn its host into a dried-up mummy through which it cuts a neat, circular hole and emerges an adult, ready to mate and deliver its own eggs to ten or 20 additional aphids.

At the University of California, Berkeley, entomologist Ken Hagen rears the two-millimeter ichneumon wasp, *Aphidius ervi*, on blue alfalfa aphids. Like many pests, the blue alfalfa aphid is not a native species. Introduced from the Orient, it has exulted in an environment free from its most important parasite, *Aphidius*. Hagen intends to change all that. By importing *Aphidius*, he is tipping the balance back.

In the university's insectary—a greenhouse devoted to cultivating bugs—Hagen can achieve 100 percent parasitism, but success in the field is usually a more elusive goal. Sensitive to climatic changes, parasites are often tougher to please than the pests they've been brought in to control. Because California is so geo-

Adult wasp emerges through a circular hole that it has cut through shell of what was once an aphid.

graphically varied, university entomologists are introducing *Aphidius* derived from populations in France, Egypt, Iran and Japan.

Not all the insects who seek out aphids for their dinner arrive with a taste for meat. Streaming two-way parades of ants trace narrow highways between their colonies and aphid-infested plants. The allure is not the aphids themselves but a coveted by-product of their digestion.

In order to nourish a developing brood, aphids require large amounts of nitrogen-rich amino acids, the building blocks of protein, but because they live a relatively sedentary existence, their carbohydrate needs are small. Since sap is carbohydrate-rich and nitrogen-lean, the plant-sucking insects feed almost continuously, pumping it through their bodies in vast quantities in order to extract sufficient amino acids. All that extra sugar has to go somewhere, and where it goes, of course, is out the other end. Aphid excrement, a cloying solution of ten to 25 percent sucrose, is euphemistically known as honeydew. Sometimes it falls to the ground, speckling any intervening objects like lawn furniture or just-waxed cars. In arid conditions it can flake into sugary manna, collected for human consumption in Arabia and Iraq. Perhaps the miraculous "bread from heaven" that fed the children of Israel during their exodus from Egypt originated in this way from scale insects, homopterans closely related to aphids. But most often, honeydew is reserved for the delectation of other insects. According to Edwin Way Teale, it has been called "the national dish of the ants."

The relationship between ants and aphids is a barter economy based on honeydew: stroked by the ant's antennae, an aphid releases a sparkling droplet of the confection; in exchange, the ant will bare its formidable mandibles or release irritating chemicals in defense of its providers. Appropriately, aphids have earned the sobriquet "ant cows." Like cattle, their production increases when they are "milked."

More than just bodyguards, some ants actually pasture their aphid herd. Workers of a common garden species, *Lasius niger*, collect the eggs of bean aphids in the fall and guard them until spring, when they carry the hatched nymphs to nearby food plants. Other ants take a reciprocal approach, ferrying young aphids to their underground nests in spring. Concealed there, the wingless guests reproduce and feed on roots exposed by the ants. In autumn, winged females are returned to the trees where they produce sexual offspring that mate and lay eggs.

In the case of the woolly alder aphid, *Prociphilus tesselatus*, "sheep" might be a more apt analogy than cows. This species derives its name from the fluffy tufts of brilliant white wax that cloak its body. Although these aphids are tended by ants, Cornell University biologist Tom Eisner had long suspected that the "wool" served some additional defensive function. In 1971, he took a close look and made a most extraordinary discovery of skulduggery in the insect world.

Observing the aphids at close range, Eisner noticed one that seemed slightly odd. Instead of having a long plant-sucking beak, it had two sickle-shaped mandibles projecting from under its flossy coat. A careful swipe of the biologist's finger removed the wool and exposed the suspicious insect for what it was—a fraud. Not an aphid at all, it was the larva of a lacewing, *Chrysopa slossonae*. Lacewings are insects whose delicately patterned adults belie the plundering voracity of their larvae, an attribute recognized by the common names of some species—ant lion and aphid lion, for example. But no larva of *Chrysopa slossonae* had ever been found. Clearly, no one had known where to look.

Another predator, hover-fly larva has speared a luckless aphid and is draining its body of fluid.

Once disrobed by Eisner, the lacewing imposter immediately plunged its head into the fluffy backs of its neighbors, furiously plucking away tufts of wax, jerking them up over its head and attaching them to its own back, handily equipped with recurved bristles that grasped the load like Velcro. The transformation was so astonishing that neither the aphids nor their guardian ants recognized this wolf in sheep's clothing.

Nobody really knows the economic impact of aphids on world agriculture. Any effort to estimate crop losses must be expressed as a reduction of yield from what would have been obtained without the pests—an unknown quantity. And the difficulty in separating aphid damage from that of mites or other insects throws more variables into the formula. In controlled conditions, statistics are easier to come by. When experiments compare the yield of plots kept aphid-free with similar plots that are unsprayed, the difference is usually 25 to 50 percent, sometimes more, depending on the crop. Even figures like these don't account for the cost of controlling the pests, or declines in crop quality that fail to show up as reductions in yield. But no one who ever grew lettuce needs a statistician to tell him that aphids are a serious drain on agriculture.

The attack is three-pronged. By imbibing plant juices, the beak bearers sap the plant's vigor. Their honeydew droppings can coat the plant and foster the growth of sooty mold, a fungus that turns the leaves dark gray and reduces their photosynthetic ability. And, like flying syringes, aphids inoculate plants with disease. By moving from native trees to crops and back again, they provide the perfect solution to a pathogen's problem of where to go when the fields are bare, and how to get there. About 60 percent of all plant viruses are spread by aphids.

For all the power and promise of pest control, anyone who looks toward an aphidless world is dreaming in an imaginary rose garden. True, species that have stowed away to foreign lands can look forward to advances in biological control that will reunite them with parasites they supposedly left behind. Certainly the wizardry of plant breeding will concoct varieties resistant to insect attack. And chemical companies will develop ever more refined arsenals of deadly pesticides. But no creatures that can play the numbers game as well as aphids will go down for the count. In the farms and gardens and greenhouses of tomorrow, as today, nothing will be as certain as death and aphids.

Mother aphid with cloned daughter, who was born feetfirst and kicking—and no male was ever involved. Aphids have telescoped their reproduction so that an expectant mother is also an expectant grandmother.

"We make the most advanced family wagon in America.

Nothing proves that better than the competition."

Ours. **Theirs.**

Even when we showed them how,

Dodge Caravan/Plymouth Voyager is designed to move people in comfort. For easy entrance its front door swings open to 42.5". Carpeting, tinted glass, AM radio with digital clock, halogen headlamps, power steering, power brakes are standard.

You've been seeing more and more of them for a year and a half now. And grown accustomed to their looks. But when Chrysler created its new family wagons, they were so car-like and versatile, there

Ours: Plenty of legroom for the driver and passengers to stretch out in comfort.

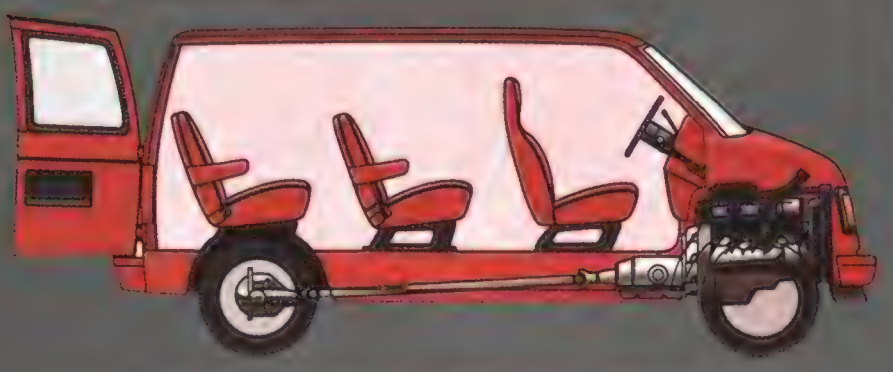
Theirs: An engine cover housing and wheel well intrude into the rear seating space.

was nothing in the world like them. They were a whole new way to get around. They still are.

Dodge Caravan and Plymouth Voyager are the only vehicles of their kind engineered with advanced front-wheel drive technology for people who like the ride of a car, not a truck. We made them street smart and weather-wise with traction and maneuverability rear-wheel drive vans don't have. We gave them rack-and-pinion power steering and power brakes, standard, to make it easy for you to maneuver and park. And because they're only 64.2 inches high, they slip into your family garage. Yet you can still wear a hat when you drive one.

Deceptively small on the outside, Caravan

Ours: Liftgate rear door for easy loading, with rear window wiper/washer. 101 horsepower standard engine. Front-wheel drive means a low, full length flat floor.



Theirs: Swing-out cargo door with no rear window wiper/washer. 92 horsepower standard engine. Rear-wheel drive creates an engine cover hump and raises floor height.

they didn't get the message.

Chevy Astro is designed more like a truck. Its front door opens to only 34.5". Luxuries like carpeting, tinted glass, AM radio, power steering and power brakes are extra cost options.

Ours: It's easy to enter with a low single step.

Theirs: Requires a high double step for entry.

and Voyager have more room inside than a conventional station wagon. Room for a young couple and all their sports gear whether they ski, hike or like to camp. Room for a family of five to grow. They can even sleep two in comfort with our new Convert-a-Bed option. And with optional seating* for eight there's room for a whole scout troop. Because the floor is flat there's even room to move around. Parents love them. Children love them. Even pets love them. In fact America loves them so much, at first we couldn't build them fast enough.

They allow you to enter like a lady and relax like a gentleman. No ungainly engine hump intrudes into the front seating space. A lot of little luxuries take you a long way in comfort. Like reclining low back bucket seats, carpeting throughout, tinted glass, a sliding storage drawer that locks under the passenger seat, cup holders, storage pockets and more.

Compare Dodge Caravan and Plymouth Voyager to any other vehicle of this kind. We think you'll agree they're not only the first of their kind. They're the most advanced of their kind. And we back them the best.** With a 5-year or 50,000-mile Protection Plan† that covers the engine, powertrain and outer body panels against rust-through. The name may be Dodge or Plymouth. But the quality is Chrysler. So is the protection. Buckle up for safety.

The New Chrysler Corporation.

We don't want to be the biggest. Just the best.

†Whichever comes first. Limited warranty. Deductible ap[illegible] See dealer for details.

Trace of light graphically illustrates sound wave projected by voice-lab researcher Lorraine Ramig.

By Donald Dale Jackson

From the lungs to larynx to lip, it's jitter, shimmer and blip

Voice signal is picked up by digital oscilloscope which displays a precise visual graph of her voice.

At Denver's Recording and Research Center new scientific techniques are nudging back the frontiers of human-voice research

The actor and the voice coach sat facing each other in a spacious recording studio on the fourth floor of a nondescript buff-colored building in downtown Denver. "I feel like I'm pushing 200 percent more than I have to, like I'm squeezing my lungs," the actor said earnestly. He was anxious to improve his performance as a comedian in the Denver Center Theatre Company's production of William Saroyan's *The Time of Your Life*. "I can find the right voice," he said, "but I need to find it more physiologically."

Voice coach Bonnie Raphael, who is also a research scientist, clutched her throat. "Maybe you're using too much here," she said, "and not enough *here*"—she dug her hands into her ribs.

In a small room at the opposite end of the same floor, a tenor from Australia seated in front of a video monitor gingerly maneuvered a rod containing a tiny lens, which was attached to a light source and camera, into the back of his mouth. A picture of his larynx appeared on the screen. "I'm going to ask you to make four kinds of sounds," research scientist Ronald Scherer told him. "Breathy, normal, normal with breathiness and pressed voice." Scherer blew a note on a pitch pipe. "Give me a G," he said.

How and why we sound that way

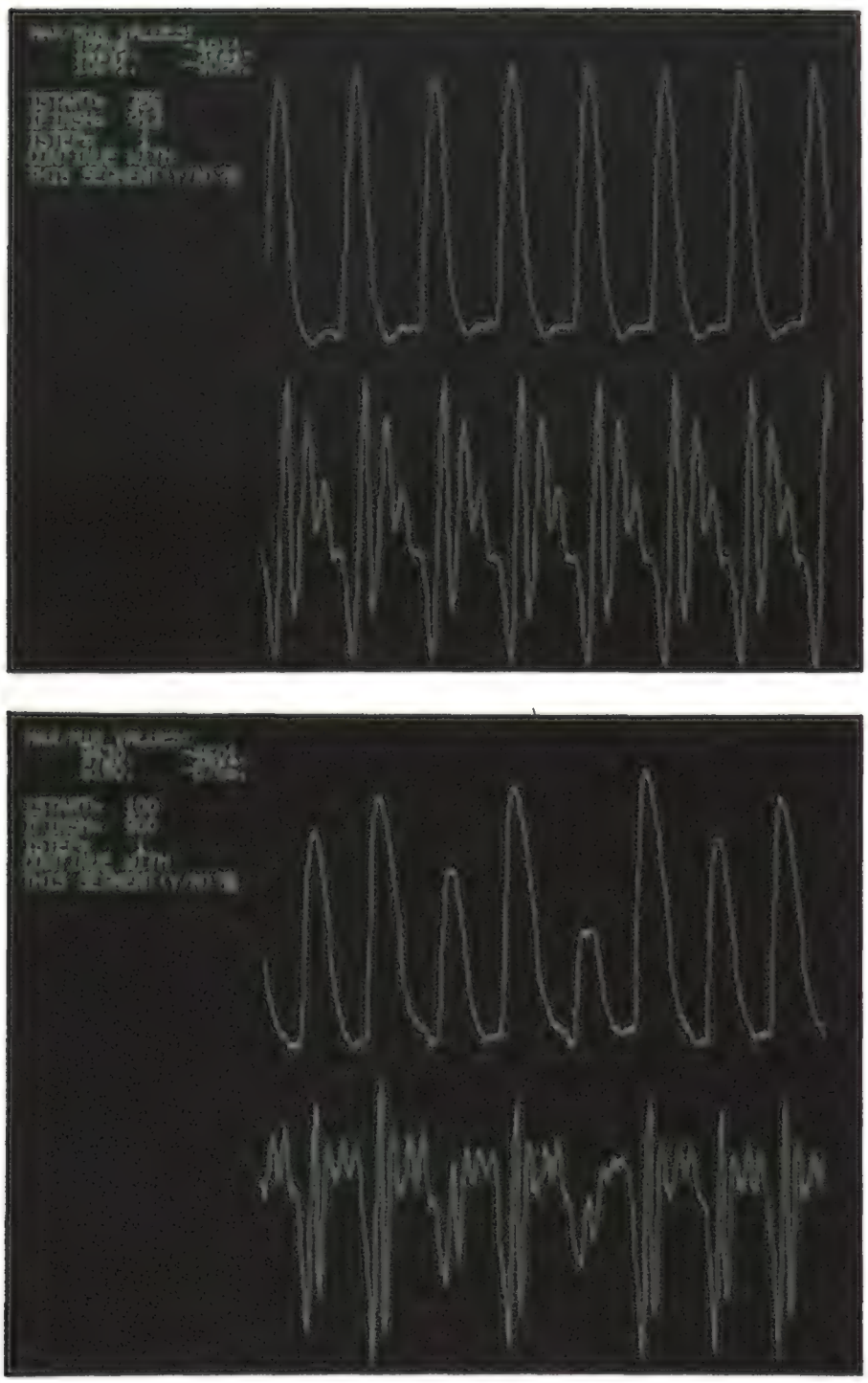
The two performers had brought their desire to hone their individual artistry to a lively and unique voice-research facility devoted to the study and enhancement of vocal production for the benefit of professionals and laymen alike. Raphael, Scherer and the other voice scientists at the Recording and Research Center, a division of the Denver Center for the Performing Arts, are using their expertise combined with state-of-the-art technology to advance our understanding of how and why we sound the way we do.

After the actor finished his warm-up exercises, Raphael listened intently as he worked his way through his longest monologue in the play, an emotional plea for a job at a waterfront dive. "I think you feel tight because you're climbing in a linear way and it's too steep," she said. "You should switch down and take it gradually, climb, then cheat back a little."

The actor nodded vigorously. "You mean like I'm kicking back down to second gear and then up again." When he said the lines again both his control and the dramatic effect seemed enhanced. "Oh, yes, yes, I see," he said happily.

On the other side of the building the tenor from Adelaide watched his vocal cords, more accurately known as vocal "folds," vibrate back and forth in slow motion on the screen. They looked like curtains opening and closing at the entrance to a red cave. A technician monitored a computer that converted the singer's

Photographs by James Balog



At top, cathode-ray tube shows a normal female voice: upper line relates to the contact of vibrating vocal folds; bottom line gives voice signal from microphone. Below, female voice with laryngitis varies from norm.

recorded notes into printouts that showed measures of such acoustic elements as "jitter," "shimmer" and a signal related to the pressure waves that travel from the lungs to the larynx. The tenor was entranced. "Did you see that sweet little epiglottis?" he asked during a break. "This has shown me more about what happens in the larynx than I ever knew before." He returned the rod to his mouth at Scherer's request—and then laughed. His vocal folds slapped together like a pair of applauding hands.

Scherer and his colleagues at the Denver center believe that the electronic and therapeutic techniques they are developing can improve almost anybody's voice. "We'll run a test on you before you leave here," he promised me. "We'll enhance your voice so you sound better than you thought you could." The idea was irresistible. Could they make a vocal silk purse out of a shaggy sow's ear? I dared to think that maybe, with the right coaching, I could sound—just a little—like Richard Burton. Or Gregory Peck. I decided that I would settle for Willie Nelson.

It is only in the past few years that voice research has come of age as a field of intensive scientific inquiry. Before 1970 there were just three voice laboratories in the United States and Canada; today there are around 35 and the number is increasing steadily. Technology made the difference, particularly the emergence of computers and fiber optics, which permits flexible bundles of finely drawn glass fibers equipped with lenses and a light source to film the larynx.

"Fiber optics made it a new field," says Dr. Wilbur J. (Jim) Gould, a prominent New York laryngologist and the man primarily responsible for the creation of the Denver voice lab. "The desire and need were there before, but the instruments weren't. We can now understand what's happening acoustically and we can see what's happening mechanically and analyze it."

Answers for a stack of questions

The scientists are now trying to answer questions that were just being contemplated a decade ago. "I have a stack of 50 or more fundamental questions we want answers to," says Ingo Titze, the German-born associate director of research at the Denver voice lab. How does the voice mechanism respond to fatigue and overuse? Can standardized norms be developed for the measurement of vocal quality and vocal disorders? Why do some voices age faster than others, and what mechanical changes accompany an aging voice?

A new vocabulary has emerged among the researchers seeking the answers. Jitter is vocal instability or irregularity measured in terms of pitch, or frequency. Shimmer is a similar variation in amplitude, or intensity, of the vocal signal. The term "folds" is preferred

Ronald Scherer uses Plexiglas model of human larynx (pictured behind him) to measure air pressure along vocal folds. He inserts folds of various shapes to mimic larynx changes as people make voiced sounds.

to "cords" because it better describes the actual process—they fold back and forth rather than twanging as a cord does. Singers apparently achieve a "pressed-voice" sound by what they refer to as "bunching up" and forcing the folds together. "Formants" are acoustical resonances of the vocal tract; opera singers have well-developed formants, enabling them to be heard over an orchestra without increasing their volume.

Jim Gould, a soft-spoken, courtly man in his 60s, is not only the godfather of the Denver voice center but also its director, despite the sometimes inconvenient fact that he maintains a busy medical practice nearly 2,000 miles away on Manhattan's East Side. Gould is something of a legend in voice medicine. Founder of the nonprofit Voice Foundation and chief of the vocal dynamics lab at New York's Lenox Hill Hospital, he has for a generation been voice doctor to the stars—of theater, music, opera and politics. On one occasion, a friend recalls, a famous opera singer who had been virtually stricken mute moments before he was to perform placed an urgent phone call to Gould; the doctor solved the problem with five minutes of therapeutic conversation.

Presidential candidates with the vocal maladies peculiar to their calling frequently turn up in Gould's office. "There's nothing more stressful to a voice than a political campaign," he says. When John Kennedy was campaigning for President his New York headquarters was the Carlyle Hotel, only a few strides from Gould's Madison Avenue office. "I'd go back and forth to his suite," the doctor recalls. "He wanted a more statesmanlike voice. He worked to improve his pitch, and he was a good learner. He studied recordings of Roosevelt and Churchill."

Gould's work with performers—"They're good patients because they're pros, they're motivated," he says—gave him the idea of establishing a voice laboratory associated with a cultural center where singers and actors would be toiling nearby. This link with a built-in company of professional performers is what makes the Denver center unique among voice labs.

His chance came when Donald Seawell, an old

Donald Dale Jackson wrote about the lost world of Cerro de la Neblina in the May issue. His book on the Civil War in the Time-Life series is just out.

Fiber-optic scope, inserted through the nose, allows direct observation of delicate movements of the larynx.

friend and founding board member of the Voice Foundation, began to put together the complex of theaters and concert halls that became the Denver Center for the Performing Arts in 1972. Seawell, a multifaceted man who has been a Broadway producer as well as a lawyer and newspaper publisher (the *Denver Post*), acquired an interest in voice research the hard way, when he was forced to cancel performances due to vocal breakdowns.

To Gould, the Denver complex seemed a perfect home for his dream laboratory. An endowment from the Bonfils Foundation—headed by Seawell—covered the bulk of the $4.5 million cost; two floors of a building that had once been the city jail were converted into studios and laboratories, and the voice lab opened in November 1983. "It's not often you have a dream that actually comes true," Gould says.

In recruiting a staff of scientists Gould sought out people whose backgrounds combined art and science. Titze and his chief assistant, Ronald Scherer, both earned science doctorates and both sing professionally. Bonnie Raphael is a voice-coach-cum-scientist.

Gould and Seawell see the voice lab's primary mission as aiding and enhancing professional voices. "If I had to put our goal in a sentence," Seawell says, "it's that Beverly Sills would still be singing."

Many singers develop individual styles that jeopardize their vocal instrument while pleasing their audience, sometimes resulting in shortened careers. Rock singers like Rod Stewart and Mick Jagger strain their voices severely when they perform. Others "learn how to create the sound they want without hurting themselves," says Scherer. Some singers and actors with a distinctive quality in their voice want to retain it—their voice is often their fortune. "I don't know how Louis Armstrong did it," Scherer confesses. "George C. Scott is another one, and Carol Channing—how do their voices endure? I'd guess that they have a structural condition of some kind that's not debilitating, and one that doesn't get worse. They can tax their voices that way without suffering. A pathological condition could produce the same kind of sound."

Other performers injure their voices through careless neglect or lack of discipline, a prime example being the great tenor Enrico Caruso. "Sometimes they're just too carefree to take the precautions they should," Titze says. "Mario Lanza sang naturally. If you tried to force him to take precautions it probably would have backfired. And he had a short career."

Both Gould and Seawell believe that the impact of present and future research projects will reach far beyond the stage. "We hope to identify and overcome voice problems ranging from the effect of pollution on the voice to the effect of aging," Seawell says. The center sponsors voice-care workshops designed to help people in occupations that tax the larynx—lawyers, ministers, salesmen, telephone operators and others.

Gould foresees a wide range of practical results from the center's work: "Understanding why your throat aches when you misuse it and how to prevent it, earlier detection of laryngeal cancer and voice disorders, and improving people's ability to communicate in general. Ultimately, we want to understand the how, what and why of making a person sound more like he wants to sound."

Sad quest for a new voice

My own quest—to become a Richard Burton or Willie Nelson sound-alike—was still on my mind. The odds seemed to lengthen appreciably when I was unable to hold the rigid fiberscope in the back of my mouth without gagging. "The greater the discomfort the better the picture," Scherer said helpfully. "It takes practice." This functional failure deprived me of the opportunity to view a vision of my larynx. I was, however, able to utter the necessary five or six words so the researchers could measure my acoustic characteristics with their computer. "Nothing abnormal," Scherer reported. "Your jitter and shimmer are in the range where they're supposed to be." This was minimally comforting. Next would come my voice-enhancement audition.

One of the first tasks the center set for itself was an attempt to explain precisely what happens biomechanically when a professional voice begins to fray and grow hoarse from fatigue. Like so much about the voice, this aspect of vocal fatigue had never been analyzed scientifically. There is no generally accepted definition of what it means. Remedies vary from doctor to doctor. The staff at the voice lab designed a pilot study which uses both fiber optics and computers with the capacity

© Eastman Kodak Company, 1985

Capture the local color.

From purple mountain majesties. To a vanishing breed of real-life hero. Remember everything you see and feel along the way with Kodacolor VR 200 film. So versatile, even if the sun goes down or a colorful character disappears into the shadows, you'll bring home breathtaking beauty and the true spirit of your travels.

Kodak film. Because time goes by.

for acoustic analysis to gain an understanding of this perplexing problem.

Scherer has his subjects read loudly for as long as they can, with a break after every 15 minutes. This taxes the voice much as a major role onstage might. Near the end of each reading the subject's voice is recorded and the computer registers its jitter, shimmer and other acoustical variables. A fiberscope is employed to study changes in the vocal folds and their surrounding tissue. "We look for changes in the color and configuration of the tissue and in the dynamics of the folds," he explains, "and for changes in texture such as edema, little water-filled bumps on the folds."

So far, in this particular experiment, the longest anyone has been able to go is an hour and a half. The preliminary results have shown a wide variation in the acoustic measures, but the physical symptoms have sometimes been striking. In one case the subject developed both edema and a slight bowing of the usually straight vocal folds after an hour and 15 minutes, which Scherer thinks was "a defensive reaction against overuse." The voice became slightly rough. Other organic signs of vocal fatigue include polyps on the folds and redness. "What we'd like to learn is which are more frequent and what conditions produce these symptoms," Scherer says, "so we can predict the effects of a given amount, and the kind, of use."

Titze believes that both the muscles and tissue in the larynx can wear down when overtaxed to the point where they cannot regenerate properly. "The tissue on the folds is bombarded constantly as they vibrate (often more than a hundred times a second) and it eventually reacts. It can happen in a couple of hours. The muscle fatigue is similar to what happens to an athlete. The mucles give out from wear and pressure, it's biomechanical burnout."

At Helen Bonfils Theatre Complex, the performers contribute to and benefit from voice-lab research.

Bonnie Raphael is interested in how the vocal demands of acting affect the voice and how the resultant stresses can be alleviated. "There's not much research on actors' voices," she points out. "This lab is the only place in the world where I can do the three things I love best—teach acting, coach and do research." To learn how actors in the Denver Center Theatre Company assess their voices under varying conditions, she crafted a series of questionnaires which they filled out. She is collating the actors' replies with their medical histories, the demands of the parts they were playing at the time, and details on rehearsal and performance schedules. Three-fourths of the actors in the Denver company volunteered to take part.

Better sounds are in sight

The actors reported that when their voices were at their best the sensations they felt were effortlessness, "sympathetic vibrations" and relaxation. The sounds they projected were resonant and mellow—"like a flowing river," one replied—no blips. When their voices were off they felt scratchy, heavy and tired; one commented it was like "running an engine and tuning it at the same time."

Raphael hopes that her survey will eventually produce guidelines helpful to actors, directors, producers and medical personnel who treat voice professionals. They, in turn, will be able to identify the most harmful working conditions. "Rehearsals can be shortened or structured differently," she says. "A two-hour rehearsal of a screaming scene can knock an actor out."

Voice science has been handicapped by the absence of standards for healthy and unhealthy voices. "All we've had," Titze says, "is someone listening and telling you that you sound hoarse. We'd like an objective judgment of what's normal and abnormal. If it's abnormal we'd like to identify the abnormality—a growth on the folds, muscle weakness or whatever." The Denver center's most ambitious research project is an attempt to fill that void through a computer software program acronymically called GLIMPES, for Glottal Imaging by Processing External Signals.

Titze devised the program that incorporates a model of the voice's various elements—the airflow from the lungs, the shape and movement of the folds, and acoustic components such as frequency, jitter and shimmer. "It's like seismic exploration," he says. "We measure *external* signals to find out what the vocal mechanism is doing," rather than use invasive procedures. The computer derives the measurements from a subject's recorded voice and compares them to

© The Upjohn Company 1984

A century of caring.

To help people with insomnia wake up to a bright new day, Upjohn searches deep within the mysteries of sleep.

For many, the worst nightmare of a troubled sleep begins the morning after. The ensuing fatigue, irritability, and other complaints can affect productivity and strain relationships at home and at work.

Persistent insomnia is a complex, 24-hour problem of great concern to the people at Upjohn.

Our researchers are presently concentrating on finding ways to help patients get to sleep faster and allow them to wake up refreshed the next day.

The key to the future lies in finding out more about how we sleep. So Upjohn is at the leading edge of this effort, conducting its own research and working with sleep laboratories around the country.

For nearly 100 years, Upjohn has been helping people live a healthier, more productive life. And challenges such as this promise to make our second century of caring even more exciting than the first.

For booklet "What You Should Know About Insomnia," write INSOMNIA, Dept. ISM, P.O. Box 2497, Kalamazoo, Michigan 49003.

Upjohn

the model, printing the results on graphs that look like profiles of the Colorado mountains. GLIMPES represents the first attempt to use humans rather than animal cadavers to see how the larynx works. Noninvasive computers and fiber optics make this feasible.

If a set of standards for a normal voice can be validated it would have broad implications for both medicine and vocal training. "It would help us diagnose and evaluate vocal disorders," Gould says. "If we get an abnormal reading we could check for laryngeal cancer and perhaps spot it earlier." Gould thinks that before long laryngologists may have computer terminals connected to voice labs equipped with GLIMPES data. Titze envisions studios where an aspiring singer could gaze at a computer-graphic model of his larynx and match it with an ideal vocal configuration—perhaps that of Luciano Pavarotti. "We're getting close to the standards," says Titze. "We've made real nuts-and-bolts progress. GLIMPES is more comprehensive than anything done previously in voice analysis."

How and why do our voices age? Can age-related vocal changes be measured acoustically? Lorraine Ramig, a University of Colorado, Boulder, speech pathologist who is also a research associate at the Denver voice lab, wondered whether the answers might help doctors differentiate people with vocal maladies from those whose voices were simply aging naturally.

As we grow older the tissue and cartilage in the larynx degenerate, the cells atrophy and fat replaces laryngeal muscles. "Old people's vocal folds are thinner," Ramig says, "so they vibrate faster, like skinnier strings on a guitar." The rate of deterioration is still not known, but most of us sound different at 70 than we did at 30. Ramig has discovered that general physical condition may affect the way older people sound as much or more than their chronological age.

Curiously, when she asked her subjects in one experiment to read for 30 seconds, the perceived differences between those in good and poor condition disappeared. "They all sounded their age then," she notes. "It could be because of timing and inflection, but I also think there is a dialect of age." She speculates that some people sound old because they are expected to, or because it gains them more respect.

It is still unclear whether vocal instability and other characteristics triggered by age are traceable to muscle and tissue decay in the larynx or to similar changes in the neural system. What is clear is that people's voices age at different rates, and that vocal health often reflects general physical well-being. Ramig's PhD dissertation, "The Effect of Physiological Aging on Select Acoustic Characteristics of Voice," could be informally titled "Run for Your Voice."

Even scientists concede that a truly great voice, a Caruso or Sutherland or Ella Fitzgerald, is a sublime wonder that resists dissection. But they also believe that science can unravel some of the mystery and point the way to better vocal training. A knowledge of vocal mechanics, they contend, may help make an ordinary voice extraordinary. Professional singers learn to lower their larynx through muscle control. This creates a larger "horn," or resonance chamber, in the throat that appears to result in what scientists call the "singer's formant" and singers call the "ring." The singer transmits a powerful, concentrated tone that cuts through competing sounds. Ingo Titze would like to program the physiological elements of the formant into his computer so that they can be quantified and better understood.

"I sounded like a bad glee club"

The best can become better, Titze and his colleagues believe, through greater body awareness. "With professionals the big problems usually come after a performance," Titze says, "with the parties and champagne and noise and smoke. A singer lets up like an athlete does in the locker room after a game," and a lot of damage can be done to the voice then.

But if the best can become better, does it follow that the worst can become acceptably mediocre? The time had come at last for my venture into voice enhancement. I was to record my tremulous, undertrained baritone and then see what the wizards in the control room could do with it. "We can fix it," they assured me. I sang, diffidently, a ditty that need not be repeated here. They lowered the pitch. They added reverberation. They multiplied me so I sounded like a bad glee club. Bravely they attempted to disintegrate my quaver, but it was hopeless. Technology had met its match. The engineer patted me compassionately on the shoulder. "Stick to writing," he said.

Lab's voice, speech and dialects coach Bonnie Raphael, in red, gets into the action working with actress Penelope Miller: at bottom, tongue stretching; top left, checking airflow; top right, relaxing larynx.

Now Imagin
On A Slightly La

The decks are strung with lights that soar high above the sea, framing the deepening indigo of the night.

Far below you, on the water, the reflection of a tropical moon scatters into a thousand glowing bits.

When evening comes, on a Royal Caribbean cruise, you'll see that all the romantic stories you've heard about cruising are absolutely true.

You'll sip a vintage Bordeaux, savor a perfectly prepared leg of lamb, indulge yourself in Cherries Jubilee flamed right at your table.

You'll watch the silent passing of a freighter, far out on the horizon. And dance under more stars than you ever thought the sky could hold.

And you'll find that the warmth of the islands lingers in your mind, long after the sun goes down.

So talk to your travel agent about a Royal Caribbean cruise. For seven, eight, ten or fourteen days.

After all, some things are just too good to be left to your imagination.

ROYAL CARIBBEAN

Song of Norway, Song of America, Nordic Prince, Sun Viking
Ships of Norwegian Registry

The Same Idea, ger Scale.

FROM NOW UNTIL 1988, EVERY DIVE COUNTS.

They're going to invest thousands of hours and make thousands of dives. They will practice until perfect, then practice some more. They will compete against the best, striving to become better. Working, ultimately, toward the special goal of representing the United States in 1988. That's why Phillips Petroleum has been a national sponsor of United States Diving since 1979, and United States Swimming since 1973. We'll support them in the future, as well. Not just to help our best. But to introduce many more youngsters to the rewards of competitive swimming and diving. Because no matter how much they may achieve in the pool, the things they learn can make them all lifelong winners.

PHILLIPS 66

Roads scholar Agar traveled with Baltimore driver Ted Brooks (seated in cab) as part of his research on people who operate their own trucks. Brooks, a former salesman, mans an 18-wheel 1984 Mack Super-Liner.

By Richard Wolkomir

For many truckers, life on the road is an uphill struggle

Anthropologist Michael Agar's in-depth study of independent operators reveals a wide gap between their freewheeling image and reality

At 2 o'clock on a chilly October morning, Michael Agar, a bearded University of Maryland anthropologist, stood in the moonlight outside a modest Baltimore home eyeing a parked Kenworth cab-over tractor-trailer. He was about to make his first trip in a big truck, but he didn't know how to get in. The truck's burly owner, Jack, a logbook in his hand, regarded Agar with a grin. "It's boots-and-saddles time!" he rumbled. "You ready to ride?"

Agar, an easygoing 40-year-old who wears jeans and flannel shirts, had recently told the Maryland Independent Truckers and Drivers Association (MITDA) —of which Jack was a member—that he planned an anthropological study of people who operate their own rigs. Shortly afterward, Jack called Agar at his Washington, D.C., apartment from a truck stop. He was rolling in from Kansas, his trailer loaded with 40,000 pounds of rubber inserts for Army tank treads. He would spend Sunday with his family in Baltimore, then leave before dawn on Monday for Newark. "Dr. Truck," as Agar has been dubbed by one newspaper, was invited to come along.

Photographs by Kay Chernush

An anthropologist looks at truckers

At a truck stop in Frederick, Maryland, a driver gets ready to haul loaded trailer on a foggy night run.

Agar is on the cutting edge of a relatively new kind of anthropology. Traditional anthropologists studied primitive societies in an attempt to find out what made them work. But now that "pure" cultures are as rare as snow leopards, many anthropologists are examining our own society instead, focusing on such specific segments as commercial fishermen, locomotive engineers and bureaucrats. The aim is to identify the particular problems and issues that shape a group's outlook and actions.

Such "applied" anthropologists are helping industry and government make decisions on a broad range of issues. Agar, for instance, once studied heroin addicts at the National Institute of Mental Health Clinical Research Center in Lexington, Kentucky. He learned that, although they recognize that they have severe problems, most junkies are also very proud of their resourcefulness and street savvy. That revelation clearly indicated the need for treatment centers to put much more emphasis on the positive aspects of the addicts' self-image.

In the U.S. Department of Agriculture, anthropologists are being consulted on which new crops and technologies will be acceptable to various third-world cultures. Agar himself exemplifies an anthropologist helping corporations. His work on truckers is being used by a Midwestern transport company that wants to recruit and retain more independent drivers.

Agar's aim in studying truckers was to examine how national policies affect private lives. He interviewed hundreds of independent drivers, 17 of them extensively, and spent 40 days in tractor cabs, including three long-haul trips—one to Texas, one to Oregon and one to Gary, Indiana. Early on, a clear theme emerged: there is a wide gulf between the independent truckers' popular image as freewheeling, good-time cowboys of the interstates, fostered by a spate of popular movies and novels, and the reality. Independents, Agar discovered, have precious little true independence, and that rankles them.

On the first morning of his project, with Jack's tractor-trailer looming over him, Agar's most pressing question was: How do I get into this cab? He was struck by the rig's size: from radiator to tailgate, it stretched 60 feet. The door handle, mounted at the door's bottom edge, was above his eyebrows. There was a grab rail for his left hand and a two-step ladder to mount. But which foot should he put on the ladder first so that he could grab the rail, step up, open the door and swing gracefully inside? It turned out to be the left one.

He sank into the cab's plush seat, which was cushioned by the truck's compressed-air system against the jolts of 80,000 pounds of loaded tractor-trailer hitting potholes. Slung behind the cab was a sleeping compartment. Independents avoid the expense of motels by sleeping in compartments that range from a box with a bunk to elaborate rooms, the most luxurious outfitted with stoves and refrigerators.

Agar soon learned that drivers like Jack have good reason for avoiding motel bills. Most independents are doing well if they clear $15,000 a year. Some are single and a smattering are women, but the majority of the

A frequent contributor, the author wrote about the Bronx High School of Science in May, camping clothes in January, talking pets in August 1984.

Having completed an outside inspection, he turns on interior light to check his instruments and gauges.

country's 100,000 or so independent truckers are married men. Typically, the husband drives the truck and the wife helps run the business. "It's not easy to be a truck driver's wife," says Rita Bontz, who is president of MITDA. "Some wives do the bookkeeping, and in addition, they must endure their husbands' long and frequent absences, raising the children by themselves." Often the wife must also take on an outside job to help keep the family afloat. And no wonder: the average new tractor-trailer rig costs more than $100,000 and the monthly payments can top $2,000.

Smokey and the Bandit to the contrary, independent truckers spend much of their time on the road worrying, for their trailer's cargo—which may be anything from steel girders to frozen chickens—is their responsibility. If a malfunction in a refrigerated trailer, or reefer, raises the temperature inside a few degrees, the customer can reject the load. "When that happens," says Agar, "the independent is the proud new owner of 40,000 pounds of warm lettuce."

On his first truck trip, from Baltimore to Newark, Agar learned that just driving the huge machine can be trying. As Jack settled behind the wheel, tossing his logbook onto the doghouse, the diesel engine's boxlike cover that sits between the seats like a table, Agar studied an airlinerlike profusion of instruments. Some he recognized—the fuel gauge, the speedometer—but most he did not.

"This pyrometer measures the temperature of the exhaust gases at the manifold," Jack told him. "There's your ap gauge, showing the brake system's air pressure, there's the tachometer. . . ." The tachometer, a gauge of the engine's rpms, is vital because, as Agar soon discovered, constant shifting is what driving is all about. Typical of big trucks with 13 forward speeds, Jack's gearshift lever had two buttons on the handgrip, each a separate shifting device. Eyeing the tachometer, Jack constantly moved the lever and pushed the two buttons in different combinations, varying the engine's pitch between a whisper and a roar.

Rolling up I-95 toward Newark, the seats squishing and the diesel rumbling, Agar began to understand how it feels to captain 40 tons of truck and load. "You're *up* there and you have a sense of cars swimming frantically around you, like minnows," he says. "You're continually monitoring your instruments and mirrors, checking the traffic and that trailer stretching out behind. It's far more intense than driving a four-wheeler, as truckers call automobiles."

Leaving the interstate at Newark, Jack squeezed the rig down a narrow side street. At their destination, Agar held his breath as Jack backed the huge trailer onto the warehouse's narrow apron. "Backing a big rig is like trying to roll backwards through a revolving door on a skateboard, carrying skis," says Agar. One driver told him about a tight unloading ramp at a Cleveland packing house, where truckers had to gauge their position to within half an inch to clear a power-line pole. Finally, the company moved the offending pole. "After that," said Agar's friend, "I never could hit that damned platform to save my life."

The typical trucker doesn't exist

Agar began his study at a MITDA meeting in the basement of a Maryland firehouse. He had expected a roomful of swaggering men with forearms like howitzers. "But the 30 people sitting around the metal card tables were pretty much like anyone else," he says. "They were tall, short, burly, skinny, young, old, men, women, white, black, laconic, eloquent and one had a college degree." Truckers, he learned, fit no stereotypes. As one told him: "We had a guy working here who was a graduate of Oxford University in England. I worked with a guy out of Wichita years ago who spoke seven languages, including Chinese. He had dropped out of a medical school in Vienna. You will find the whole spectrum in the trucking industry, from crooks and illiterates on up to well-educated people."

Most drivers get into the business because they love trucks, like to live on the move and don't want to work for someone else. "Ever since I was a little kid I've always been attracted to trucks, I guess," a Baltimore independent named Ted Brooks told Agar, adding that he had earned a college degree in agriculture at his

Lighting a cigarette, a trucker heads for the diner past parked rigs in which other drivers may be asleep.

father's bidding and then became a salesman. But he always longed for the open road. "I'd see those trucks going up the beltway, up through the harbor tunnel and all," he said. "I just wanted to tag along behind them and go wherever they were going instead of going downtown and making sales calls." Finally, he scraped together enough money to buy a five-year-old tractor. As part of his research, Agar accompanied Brooks on a 6,000-mile, 11-day haul from Baltimore to Oregon and New York. They carried laminated plastic on the way out and Bosc pears on the way back.

Agar talked to a black man who was raised in rural North Carolina and became a driver in 1942, at age 15, hauling logs to a sawmill for $13 a week. A woman driver told Agar that she had written a term paper on trucking for her college English class, then went out and "bought a rig and left town," hauling machinery and steel across the country for several years. Finally, she left trucking for journalism. She sent Agar a poem about trucking "in memory of the countless times I thought of Einstein's theories while westbound on the turnpike in the middle of the night."

Agar discovered that most independents worry a great deal about being caught in a tight squeeze between government regulations and the carriers who hire them. One particularly controversial Interstate Commerce Commission rule was finally scratched last December. It prohibited independent truckers from contracting for loads on a trip-by-trip basis. Instead, a driver was required to lease himself and his rig to a trucking company for at least a 30-day period. The aim was better enforcement of safety regulations. But from the truckers' point of view, the regulation's chief effect was to give companies control over the loads they could carry and the rates they were paid.

Scrounging for loads to take home

For instance, a trucker who hauled a load from Baltimore to Seattle would need another load to haul home, since traveling back empty (deadheading) or returning with just the tractor (bobtailing) represented a loss, given the cost of fuel, maintenance, tire wear, meals, tolls and lost time. But if the carrier to whom he was leased had no return load for him, the trucker needed the carrier's permission to scrounge a load for himself. If the carrier granted permission, it usually took a percentage of the trucker's fee for the free-lance return load—an average of ten percent. This covered the carrier's expense in insuring the truck and other administrative costs, but some truckers claimed carriers sometimes took too high a percentage.

Now that this rule no longer applies, independents are free to lease their equipment by the trip. But many of them believe this arrangement creates a whole new set of problems. Here is one example: most owner-operators own just a tractor, so when they lease with a company they're hauling the carrier's trailer. If the carrier assigns a one-way trip to the driver, the only way he can pick up a job for his return leg—which will be loaded on another trailer—is to drop off the original trailer. Sometimes the carrier then hits the driver with a drop-off charge.

Many such dilemmas facing truckers today are a result of deregulation of the trucking industry, which began with the Motor Carrier Act of 1980. Some truck-

ers lobbied for deregulation because they believed that it would free them from governmental constraints and enable them to capitalize on the opening up of a free marketplace. But others argued that it would lead to rate wars among carriers, with the truckers becoming the victims. According to many independent owner-operators, this is exactly what has happened. The competition engendered by deregulation did lead to declining rates, and a lot of carriers passed on more of their operating costs, as well. The truckers are putting up with this because most of them now agree that long-term leasing is preferable to the hassle of operating on a trip-by-trip basis.

Trouble in the middle of the night

Another constant pressure on the independents is the cost of repairs. During each of Agar's long-haul trips to Oregon, Texas and Indiana, the trucks suffered serious breakdowns. He was aboard a refrigerated rig around midnight on a two-lane highway "in the middle of some beautiful, isolated Western nowhere" when the diesel shuddered and died. The driver slumped over the wheel, defeated, and said, "I think this is really it." Summoned via CB radio, another trucker drove Agar a hundred miles to the nearest town to find a tow truck. Meanwhile, the stricken truck's owner nursed his rig's refrigeration equipment, hoping to save the load. "We left him with a can of Coke, a bag of cookies and an extra blanket," says Agar. Eventually, the rig had to be towed to Reno, Nevada. Its crankshaft was cracked. The towing bill was $750. Repairs cost $4,500, which the driver had to finance himself. "The trip, obviously, was a total disaster," says Agar.

Agar learned that, besides wanting a say in their rates and more freedom to shop for loads, truckers yearn for uniform regulations. A truck that is legal on the federal interstates at 60 feet and 80,000 pounds might be too long and too heavy as soon as it exits onto a state highway to deliver its load. License fees, fuel-permit fees, axle taxes, per-mile taxes, and other charges also vary from state to state. "There isn't much about a driver, his truck and his freight that doesn't fall under somebody's rules," says Agar. Each driver must keep a running log of when he is driving, unloading and resting to ensure that he does not exceed the regulated maximum of 60 hours behind the wheel in any seven-day period. Truckers do not even have control over their own schedules: an independent driver hauling 800 boxes of pears may "fingerprint" the boxes on or off the trailer himself, but just as often he must endure long waits until other trucks clear out or "lumpers" unload the trailer for him.

One reason for delays is that most people work 9-to-

It's important to maintain an expensive rig. On wash day, a trucker uses high-pressure nozzle to get at grit.

Big trucks require constant shifting. When gearing up, a driver may need a mile to reach cruising speed.

An operator makes a daily check of his engine, looking for potential trouble. Breakdowns can spell disaster.

5 shifts while the truckers work runs. The trucker's workspace is different, too. Instead of saying he works in a certain factory or city, a trucker will say he works "on the East Coast" or even "cross-country." People who live and work in one place often have trouble comprehending the trucker's mobile life-style. "I can be talking to a guy one day," a driver told Agar, "and then be gone a thousand miles and come back two days later, and the guy can't imagine what I just did." Truckers try to average 100,000 miles a year. Some, says Agar, prefer a particular region like the Southwest, while others travel nationwide. Whatever his territory, the trucker's world is long and skinny, the width of a highway, punctuated with warehouses, factories and oases called truck stops.

The truck stop is a kind of club where drivers can relax and mingle. Some of the more elaborate facilities offer anything a trucker might need—repairs, showers, laundromats, telephones, food and even Long Haul Cologne. At such places truckers swap stories about harassment by certain officials at particular weigh stations and about unfair carriers. They complain about epic unloading "detention times" and speculate about mysterious cargoes that have to be checked with Geiger counters before they can be unloaded.

Agar has written a book about the subject of his research, which will be published by the Smithsonian Institution Press next spring. In it, he concludes that the independent driver is caught up in a struggle for economic survival which he may very well lose. "If these guys are any indication," he says, "the small businessman in this country is in serious trouble."

The main reason independent truckers are willing to stay in such a difficult business, Agar has decided, is that they relish the odd hours, like not being confined to one spot and get a kick out of commanding so much tonnage and horsepower. Many of them, he says, are loners who enjoy the cab's isolation, and apparently the romance of the road never loses its appeal.

"When you're driving out of Virginia and Tennessee into the red clay of Mississippi at dawn," says Michael Agar, who now serves as the MITDA's secretary, "and a mist is coming up from the fields and the forests, you feel the pull. You think, I wouldn't mind getting into this for awhile. And then your fuel filter clogs—and the engine dies."

Riding in the "navigator" seat, Agar listens as Ted Brooks talks on his CB radio. At the end of their trip to Oregon and New York City from Baltimore, the anthropologist helped lump, or unload, cargo of pears.

Get away with murder for FREE

Receive the greatest mysteries ever written FREE for 15 days.

Think of your favorite whodunits, most popular sleuths, best known mystery writers. They're all included in THE COLLECTION OF MYSTERY CLASSICS.

We asked a panel of mystery editors to select the best in every category. They came up with a list of classic suspense and detection novels you'll want to read and reread, save, share and enjoy, again and again. They're all intriguing tales of murder, cunning and crime:

THE HOUND OF THE BASKERVILLES, a spine-tingling Sherlock Holmes story by Sir Arthur Conan Doyle.

DEATH IN A WHITE TIE by Ngaio Marsh with urbane Roderick Alleyn of Scotland Yard.

TOO MANY COOKS, a bizarre murder mystery for Nero Wolfe to solve, by Rex Stout.

MURDER AT THE VICARAGE pits Miss Jane Marple's intuition against a cunning murderer, created by Agatha Christie.

Enjoy solving another mystery masterpiece every month. Each exclusive Dorset Edition volume is bound in rich, durable, burgundy-red padded leatherette, and goldstamped for added elegance. Its smythe-sewn pages and acid-free paper can withstand years of handling. Your beautifully bound mystery volumes, not available in any bookstore, will become collector's items for your family, a lasting home library.

Examine your first volume FREE for 15 days. If you're not completely satisfied, just return it and owe nothing. However, if you decide it's the perfect mystery in the perfect binding, just pay $9.95 plus postage and handling. Books of this quality usually sell for twice that amount.

Each month, thereafter, you'll receive another mystery classic on the same 15-day free-examination basis. There's no minimum number to purchase and you may cancel your subscription at any time.

Preview this exclusive new collection of handsomely bound mystery classics without risk or obligation. Mail this coupon today.

THE COLLECTION OF MYSTERY CLASSICS Bantam Books, Box 958, Hicksville, N.Y. 11802

YES, I want to get away with murder for FREE with THE COLLECTION OF MYSTERY CLASSICS. Please send me The Hound of the Baskervilles for a FREE 15-day examination. If I'm not delighted, I may return it and owe nothing. If I decide to keep the book, I will pay just $9.95 plus postage and handling. Then, each month, I will receive another mystery classic on the same fully returnable 15-day free-trial basis. There is no minimum number of books to buy and I may cancel my subscription at any time.

20164

Name _____

Address _____

City _____

State _____ Zip _____

Send no money. Mail today. **MAA04**

Light through glass.
In the Middle Ages they used it to tell stories.
The message is still clear.

MANUFACTURING PLANTS: ANN ARBOR, MI • ATLANTA, GA • CONCORD, NH • CREEDMOOR, NC • DALLAS, TX • MARLTON, NJ • MINNEAPOLIS,

Light through glass.
Today Northern Telecom uses it to transmit images, voices, and data simultaneously.

In the Middle Ages, stained glass was a powerful communications device, a way of instructing a population that was mainly illiterate. The life of Christ, the deeds of the saints, and the adventures of kings were all told vividly and wordlessly.

Today, we're still pouring light through glass to communicate. We're sending voices and data, digitally coded in tiny pulses of light, through fiber optic cable.

In Saskatchewan, Northern Telecom is building the longest digital fiber optic network in the world. When it's completed, it will offer a rural population, scattered over 100,000 square miles, facilities for transmitting voice, data, video, and facsimiles of documents and photographs.

Northern Telecom is both a major manufacturer of fiber optic products and a world leader in digital telecommunications technology.

We already have thousands of digital switching systems in service or on order, serving the equivalent of over 16 million telephone lines—far more than any other North American manufacturer. A long time ago, we saw the light.

nt northern telecom

For further information write: Northern Telecom Inc., Public Relations Dept., 259 Cumberland Bend, Nashville, TN 37228. Or call (615) 256-5900, Ext. 4264.

ORRISVILLE, NC • MORTON GROVE, IL • NASHVILLE, TN • RALEIGH, NC • SAN DIEGO, CA • SANTA CLARA, CA • WEST PALM BEACH, FL

© Northern Telecom Ltd. 1985

By Israel Shenker

In this stately pile, the sublime and ridiculous coexist

Through centuries, an eccentric succession of aristocrats, without rhyme or reason, made Calke Abbey into a unique time capsule

At Calke Abbey disorder oozes into many corners, creeps ceiling-high, seeps to the windows and struggles to escape through the doors. One family has owned and lived in it over the centuries. For the past 150 years almost nothing in this great English country house has been thrown, or tidied, away. When a room filled, the door was shut and the procession moved on.

The whole place is chockablock with treasures and detritus—animal, vegetable and mineral. For generations the people inhabiting the house have loved animals, particularly those of the taxidermic species, especially those they shot themselves. Next to the front hall, the musty bird lobby is crammed with cases of stuffed birds, and the overflow has flitted to more secluded eyries upstairs and down—dusty bedrooms, neglected nurseries, abandoned lounges.

Unstuffed skins lie about, whiling away the decades waiting for the taxidermist. In one derelict bedroom, drawers are full of mounted moths and butterflies. Decorously framed nearby are enchanting beetles and cherished bugs. Stuffed mice frolic in their own glass enclosures, and there is even a case of seconds in stones and fossils.

On the ground floor, one large room painted chocolate brown is hung with bovine portraits, splendid

Memories, memories . . . like other rooms at the Abbey, this one was filled, shut and embalmed by time.

Photographs by Michael Freeman

The South Front: the neoclassical portico was added in 1806-08; otherwise, it is as built, 1701-03.

animals loftily surveying the realm of human disarray. The chamber is awash in disorder—papers, books, magazines, letters, envelopes, bills, advertisements, cancelled checks, yellowing photographs. Midstream in the flotsam, compressed into worn tweeds, 64-year-old Henry Harpur-Crewe looks for a letter that arrived a month earlier. He exudes an air of resolute pessimism: this is the day fate has chosen to frustrate his every design. "It's best to be more untidy than I am today," he said, "because then I can find things more easily. My brother was untidy, and my grandfather was, too."

Down the generations, the great house has been irreparably marked by the family's predilection for letting things slide—and fall where they would. While celebrated houses were zealously restored and preserved and visited, Calke remained obscure and grew increasingly dilapidated, its beauties dormant, its oddities neglected and forgotten.

Even the cavernous old kitchen, Black Hole of Calkecutta, replete with rusty ancient utensils, has its forsaken feathered specimens, including some whose bell-jar receptacles have broken, with the birds standing poised for takeoff. Wild eyes peer out of the gloom into the shadowy depths of eternity. "My grandfather used the old kitchen," said Harpur-Crewe. "You couldn't use it today. One person wouldn't go down there alone. Carry anything down there? Not even three people would do it."

One of Calke's rare visitors opened a large wooden chest and discovered there—unused, perfectly intact, colors wondrously fresh—sections of the State Bed and its lavishly ornate Chinese silk hangings, 250 years old. "I thought they had been stolen years ago," said Harpur-Crewe.

A huge quadrangle of sandstone from the estate's own quarry, Calke Abbey was built in the first years of the 18th century on the site of an ancient priory near Ticknall, south of Derby. With its own farm and park and church, it stands at the end of a two-mile private driveway, hidden in a hollow. "I've been told there are 86 rooms," said Harpur-Crewe. "I'd think myself there were more, say a hundred."

His brother's death in 1981 left him sole heir—owing £8 million in taxes, or more than $10 million at current rates. Interest was running at about $1,650 a day. "I didn't know what was going to happen," noted Harpur-Crewe. "I put the horror at the back of my mind—putting off the evil day."

The deposits of Calke, the whole archaeology of the place—paintings, furniture, clothing—all this was fair game for the tax man, and when Harpur-Crewe heard that species mentioned he bristled. Tax made him think of taxidermy. "Wants shooting!" he cried. "Wicked thing! They got a million out of me and they expect me to lie down where they tell me to, and sit where they tell me to. It's a wonder they don't take my personal things, like these trousers"—and he demonstratively grabbed hold of one leg of his pants. "I can't hide everything, can I? I can't put everything under my bed, can I? Anyway, they'll come and find it."

When landed gentry are at wit's end over how—short of theft or losing their shirt—to save their stately homes, they offer them to the National Trust. This charitable body is Britain's greatest private landowner, preserving hundreds of buildings, including about 200 houses open to the public. It owns, restores and displays castles, parks, gardens, the palaces of the erstwhile rich, the cottages of the immortal great, 450 miles of unspoiled coastline, follies, monuments, archaeological sites—altogether spread out over half a million acres of open countryside. The Derbyshire home seemed a worthy addition. "Calke is a place where the clock has stopped," said the National Trust's Martin Drury.

Tax authorities agreed to set off several million pounds of tax as counterpart for Harpur-Crewe's gift to the Trust—covering Calke and contents, plus church and stables, and parkland near the house. Though the Trust required an endowment fund to run Calke, the government opted for metaphysics and maintained that the aura of "heritage value" declined with distance from the stately home: outlying land could not qualify as an endowment. But the story of the great time capsule of a stately home was widely publicized, and the government was taken to task. "The Treasury's intransigence means that although the government

A former writer for Time *and the* New York Times, *Mr. Shenker now lives in Brig o' Turk, Scotland. He wrote about Dr. Johnson in December 1984 issue.*

One man's treasure is another man's detritus. At right, in one of the rooms that time forgot, is collection of lovingly made botanical specimen books. Below, helter-skelter of boxes contains carefully selected egg collection. At lower right, a nest of drawers serves as a surreal resting place for collection of dolls; some are in their original boxes.

The schoolroom at the Abbey holds the deserted toys of yesteryear; some are more than a century old.

accepts the value to the National Heritage of this house," noted the *Financial Times*, "at the same time it is refusing to make it possible for it to be supported."

To members of Parliament, SAVE Britain's Heritage (a conservation lobby) rushed protests proclaiming: THIS MAGICAL HOUSE MUST BE SAVED INTACT NOW!

Letters to the *Times*, hallowed forum for influencing public opinion, clamored for Calke's preservation, and the Department of the Environment agreed to descend once more into metaphysics to check the extent of aura.

The late Lord Vaizey, a member of the Parliamentary Heritage Group, objected that much of Calke's treasure was "junk of two centuries, never sorted out by a new wife, just piled up and rarely if ever cleaned." The reply came from Howard Colvin, one of Britain's leading architectural historians and author of *Calke Abbey, Derbyshire: A Hidden House Revealed*—to be published in September. He argued that Calke was "like a sealed archaeological deposit"—a place to see a vanished world. Colvin suggested that if Lord Vaizey had looked closely, "he might have written less disparagingly about a collection which includes Bronze Age swords, silver by Paul de Lamerie, 18th-century Chinese silk hangings in mint condition, an autographed musical score by Haydn, trophies of the battle of Trafalgar, the library of a famous Egyptologist, and paintings not all 'indifferent,' by Landseer, Lawrence, Linnell, Ruysdael, John Ferneley, Sartorious and Tilly Kettle."

In March 1984, the Chancellor of the Exchequer broke with tradition, and in his budget speech departed from national issues to announce the rescue of a single house: the Treasury would give the National Heritage Memorial Fund £4.5 million with which to save Calke Abbey. Additional funds would come from English Heritage and the Harpur-Crewe family itself, with a £1 million donation from the National Trust.

To launch a public appeal for a quarter of the Trust's contribution, the Duchess of Devonshire came down to Calke from her stately home at Chatsworth. She spoke nostalgically of the good old days of Harpur-Crewe's grandfather, Sir Vauncey, who used to pop away at anything that required stuffing—whether on the wing or on all fours. And how would he have reacted to that day's gathering? "Burnt the tent and shot us," suggested the Duchess. "No doubt he would have had the best of us stuffed and put in a case with 'Shot by me at Calke Park' underneath."

Even before it took title last March and confronted its greatest challenge ever, the National Trust drew up an order of battle. Its architect advised urgent evacuation of the contents of Sir Vauncey's room "because of movement in the ceiling-frieze plaster." Immediate attention was required for "eradication of dry rot outbreak in north range." Seriously decayed animal specimens "need to be destroyed after photographing." One group of packing cases was meticulously labeled: "These boxes are empty or the content completely destroyed by Anthrenus infestation. Dec. 1983."

A Trust administrator entered into delicate cohabitation at Calke with Harpur-Crewe, who retains a

Master of the house, Sir Henry Harpur-Crewe poses in library, book ladder at hand, an easy chair nearby.

hereditary interest in his apartment there. The Trust has set to work photographing everything, each article of furniture, all the paintings, all the animals, every last knickknack. The two women assigned to compiling the inventory are using oil paint to inscribe minuscule catalog numbers on each object. Noted Sally Rix: "We look through drawers no one has looked through before. I opened one door and found a note from Sir Vauncey saying, 'This cupboard has been cleaned in 1921 and will not need doing for another six years.' "

"I found an old trunk in the cook's room," said Sarah Johnson, "and it revealed the most astonishing collection of late 19th-century children's clothing—all beautifully preserved. The family is alive here."

There are lovely silk garments, books of dried flowers, Victorian dolls and photograph albums, and German toy soldiers patiently awaiting demobilization. A barrel organ is ready to strike up a tune, and one bookcase conceals a 1761 mandolin. Behind a room where grain is stored stands a harpsichord made by Burkat Shudi, the celebrated Swiss-born instrument maker whose clients included the Empress Maria Theresa, Handel, Haydn, the Prince of Wales and, evidently, Sir Henry Harpur, Gentleman of the Privy Chamber to King George II. In the stable are coaches and gigs and pony traps, a cart for carrying coffins and another—bearing a well-preserved Victorian fire engine—ready to be drawn by horses. Ornate saddles, stirrups, riding crops and harnesses hang in place.

In a crumbling barn where ewes are nursing their lambs, the Trust is going to build a shop and restaurant for the visitors who are expected. Calke Abbey will not be ready for the public until 1989, except that the house will be opened this July 20-21 to let people see what is going on. The park will open to the public later this year.

In Calke Abbey's great Saloon—44 feet long, 31 feet wide, 29 feet high—the ceiling threatens to collapse, so dust covers have been draped over the furniture, a scaffolding has been erected and emergency repairs have been effected.

Orde Solomons, a specialist in wallpaper preservation, was summoned from London to view the perilous state of Sir Vauncey's room. "My father is a microbiologist of world renown," said Solomons. "He's expert in enzymes and can guide me." Taking careful aim, Solomons the younger sprayed an enzyme on a stretch of worn, faded wallpaper, then peeled off three yard-long lengths of 22-inch-wide panels of the wallpaper—a first installment. It was slow going. "My enzyme was a bit stale," he suggested.

John Chesshyre, the Trust's Historic Buildings Representative at Calke, is supervising all the work on the contents. "A sensible person would reprint the wallpaper," he said. "But we're going to take it all down and conserve it and keep it out of the way while building is going on, and then put it back. We're going to somewhat extraordinary lengths."

Calke Abbey, a unique time capsule

Gervase Jackson-Stops, architectural adviser to the National Trust, noted that the drawing room was still exactly as shown in Victorian albums at Calke, "one of the few absolutely authentic rooms of this date to remain intact."

Film that screens out ultraviolet rays will be put on all windows to minimize damage from the sun. Lighting was by oil lamps until 1962, when electricity was finally installed. "We ought to be asking ourselves whether we should take the electricity out," said Chesshyre, with a smile. "The drawing room is a particular problem in that the shutters have been shut so long. One possibility is to show it with shutters closed and artificial light. I resist that."

Before handing over the property to the Trust, Harpur-Crewe presented the family papers to the Derbyshire Record Office in Matlock. Overwhelmed by the bulk, the Office has put it all in a large lock-up warehouse, archival boxes piled high, with a newly compiled catalog that appears endless. There is a "small packet of grass or cereal seed" two or three centuries old and a note commemorating the planting by family members, on February 27, 1860, of trees "to be called the family clump." An early 18th-century tax return, which required the listing of all servants, bears the exculpatory endorsement: "5 Garden Men—Their Names cannot be specified on acct of their being frequently exchanged." In box 287, item 45 is endorsed "*di me Giuseppe Haydn*" (by me Joseph Haydn), and identifies marches he composed for a troop raised by Sir Henry Harpur when French invasion threatened. There is an 1898 letter offering "the wingbones of a Great Auk for sale to Sir Vauncey Crewe." No sale. He did buy a great auk's egg for 300 guineas. Nothing was too obscure to escape cataloguing, e.g., a photograph of a wasps' nest (1914) and a "Note of mud taken from Ticknall fishpond (1841)."

Calke—meaning chalk or limestone—was founded in the 12th century as Calke Priory. For a long time Calke's church was a "peculiar"—where lords of the manor appointed clergymen without reference to any bishop. In 1622 Henry Harpur bought the estate for £5,350. Henry's grandfather, a judge, had built up a substantial fortune, with property in many counties and more from marriage to an heiress whose family motto was *Cogita mori* (Reflect on death).

In 1610 James I had instituted the hereditary title of baronet—available on payment of £1,080. In 1626 Henry Harpur paid the £1,080, plus £300 to a go-between. His great-grandson married a daughter of the 2nd Lord Crewe of Steane (or Stene). Her dowry was £12,000 and she was promised £400 a year pin money, but wealth was a small consolation and she lamented that it was "better to be buried alive than married to one that gives disgust."

Their son Edward studied at Cambridge, and his tutor complained of the young man's "keeping too much in his Rooms" and "refusing all Company." It was the first note of what was to become a dominant theme—the family's passion for unsociability. Sir Henry, who inherited in 1789, was even less comfortable with people, and his mother complained that he resisted social life, did not even go to church and had "an unfortunate connection . . . with a Lady's maid." And then Sir Henry did the unthinkable and married his mistress. One treasure in the Record Office is the handwritten Marriage Settlement between Sir Henry and "Nanny Hawkins."

The headmaster of nearby Repton School called Sir Henry the "isolated Baronet." Places at dinner were set for others, but Sir Henry ate alone and gave orders to his servants in notes. He had a tunnel built under the lawn so that the staff would not intrude on his view. In 1808 he adopted Crewe—taken from his great-great-grandmother's family—as his own surname, and the Harpur coat of arms was modified to reflect the change. The Crewe motto—*Degeneranti genus opprobrium* (Betraying one's lineage is a disgrace) replaced *Cogita mori,* and Sir Henry sought—unsuccessfully—to have the dormant Crewe barony revived for him.

Outdoor amusement, no food for the mind

In 1838 his successor, Sir George Crewe, exulted that "under God's blessing, after 19 years' labours . . . I have at last cleansed the Augaean stables of Calke jobs, Calke turkey and Calke extravagance! ! !"

Sir John Harpur-Crewe, who followed, pursued what his father termed "out-of-door amusement [rather than] giving the mind any food." He concentrated on his Portland sheep, Longhorn cattle and two herds of deer. The house was festooned with antlers,

© 1985 American Medical International

That's AMI caring.

Bob Cullen's broken arm may not seem like a major problem. But consider lost productivity, worker's compensation paperwork, plus the possibilities of higher insurance rates or a liability suit and suddenly Bob's broken arm becomes a very costly headache for his employer.

But thanks to AMI's Occupational Health Centers, minor on-the-job injuries don't have the chance to become major headaches. In Bob's case, the Center gave him immediate attention. There was no unnecessary waiting. No painful delay. Within the hour Bob's employer had a full assessment of his injury and treatment. The Center also completed all the complicated paperwork promptly. And correctly. Which meant Bob was able to get back to work faster.

AMI, American Medical International, is one of the world's leading health care companies. We believe that health care is more than just caring *for* people, it's caring *about* people.

The Occupational Health Center is just one of the ways AMI caring is addressing today's most pressing health care problem—how to maintain quality care while controlling costs. If you'd like to know more, write: AMI Communications, 414 N. Camden Drive, Beverly Hills, CA 90210.

AMI®

American Medical International

In a textile jumble, stuffs and silks, dresses, suit coats and uniforms are unceremoniously strewn about.

heads of oxen and of deer, the library with portraits of horses, the grand staircase with *Council of Horses* painted by John Ferneley, and the dining table with slaughtered partridges and pheasants.

The current occupant, coming down to the early years of this century, said: "My grandmother, Sir Vauncey's wife, was outgoing, but she had to be kept down, too, by her husband." When his wife insisted on entertaining, Sir Vauncey fled to the park, and his coachman was instructed to signal the all clear when the intruders had decamped. Nothing cheered Sir Vauncey more than seeing the backs of visitors, unless it was not seeing them at all. His grandsons' nurse hurried the children out of the way whenever Sir Vauncey approached, since he did not want to see the children either, unless he convoked them to his presence.

If he deemed a fire too hot or too cold for the room's stuffed animals, he would dispatch a note ordering the servant responsible for that hearth to be dismissed. Since he had 30 servants in the house, he hardly knew one from another, and some offenders were fired—although unavailingly—as many as two or three times.

Sir Vauncey had a formidable temper. One day, chasing butterflies at Repton Park, which he owned, he crossed the lawn adjoining the big turreted house. When his cousin, who lived there on sufferance, remonstrated, Sir Vauncey turned on his heel, stalked home and instructed his agent to demolish the house. Down it came.

Fearing fire, Sir Vauncey forbade smoking. He suspected his daughter Airmyne of disobeying the rule, and one day smoke drifted up from her open window into his. He stormed down, ordered her out of the house and never let her back.

Sir Vauncey considered automobiles pestilential nuisances that frightened the game and refused to allow them—or even bicycles—onto the estate. He opposed a plan to deepen the Trent for steam navigation, arguing that it would "turn the river into a vast highway utterly destroying the fishing and wildlife shooting . . . stir up all the mud [and bring] boatloads of excursionists [and] a nice lot they would be too, out

GET THE BEST OF BAD WEATHER.

FIGHT BACK. MAKE IT EAGLE.

A dark sky and threatening forecast is enough to humble the greatest drivers among us. At times like these you need an automobile like Eagle.

With the simple flick of a switch, Eagle gives you the confidence and security of 4-wheel drive. You can even "shift-on-the-fly," which is a luxury you shouldn't be without when faced with a sudden shower, blizzard or stretch of bad road.

Of course, security isn't the only luxury you'll enjoy in an Eagle, with features available like power windows and door locks, cruise control, 6-way power seats and plush carpeting.

The American Eagle. It's the best thing going for you when you're going in bad weather.

EAGLE THE 2-WHEEL/4-WHEEL DRIVE SECURITY SYSTEM

AVAILABLE FOR PURCHASE OR LEASE AT PARTICIPATING AMC DEALERS

SAFETY BELTS SAVE LIVES

of all the large towns of Nottingham, Derby, Burton, Stoke and Newark."

His son predeceased him, and Sir Vauncey's daughter, Hilda Mosley, inherited in 1924. Then in 1949, it was the turn of her nephew, Charles Jenney. Following the terms of the will, he changed his name to Harpur-Crewe, and following his own inclinations he shunned society and neglected the elementary precautions that might have forestalled the mammoth death duties. He died while setting mole traps, leaving his brother to deal with Calke's musty disorder and deadly tax snares.

"If you're going to live here, you'd better be Harpur-Crewe," said heir Henry, who followed his brother's example and changed his name. At its high point the estate had 33,000 acres, a large income from tenants and from lime, lead, coal, copper and fishing. Today, by Harpur-Crewe's reckoning, about 2,000 acres remain to him, with about 2,000 for the National Trust. The garden, which once flourished with 58 varieties of geranium, including Calkensis and Crewensis, has run down: "Seven thousand [pounds] a year these days [for a gardener]!" exclaimed Harpur-Crewe.

"I suppose people say I'm unsocial, but my friends say I'm not. Why can't people live like they want? After all, some people thieve and live on drugs."

At last, at last, from the swirling flotsam he plucks the elusive letter for which he has been searching and holds it triumphantly aloft, hardly crediting his good fortune. This letter has come in response to inquiries by his lawyers who set out to find his heir. For Harpur-Crewe it is a message from another world. "America," he said, displaying the return address: Box 48, RR2, Bristol, Vermont. "His name is Johnson—some very distant cousin, but in the right line, my grandfather's. He went out to America. I don't know why. A sawmill, I think he's got."

"It appears we are cousins, perhaps four times removed," runs the letter from Andrew Johnson, suddenly apprised of distant kin. "My mother, ninety-three this week, and her sister, ten years younger, are the . . . great-granddaughters of Edmund Lewis Harpur-Crewe of Repton Park [father of the man whose home was destroyed on Sir Vauncey's instructions]."

Johnson writes that he is about to turn 60 and notes: "Am tall, thin, very gray, reasonably intelligent. . . ."

A visit from cousin Andrew would be welcome. "I hope he'll say before he comes," said Harpur-Crewe. Taking his cue from old *Cogita mori*, he added, "I don't want him to inherit a muddle like I've inherited."

The Saloon has been dismantled for repairs, but when it is reopened it will again look much like this.

630 Memorywriter
Electronic Typewriter

1045 Marathon
Copier

1055 Marathon
Copier

XEROX®, and the products named herein are trademarks of XEROX CORPORATION.

XEROX

When Eliot took over as manager, he Southport office was considered exceptional. Exceptionally sloppy and ex- ptionally unproductive.

So one of the first things Eliot did was ook at their office equipment and call Team Xerox.

The Xerox people studied Eliot's office nd devised a plan to fit each department's eeds. For example, in mid-sized Marathon copiers alone, they were able to choose from 31 different options.

They installed Xerox Memorywriters, with unlimited memory and displays that virtually guaranteed error-free letters and reports. And they followed up with one of the largest and most highly trained service organizations in the business.

Team Xerox

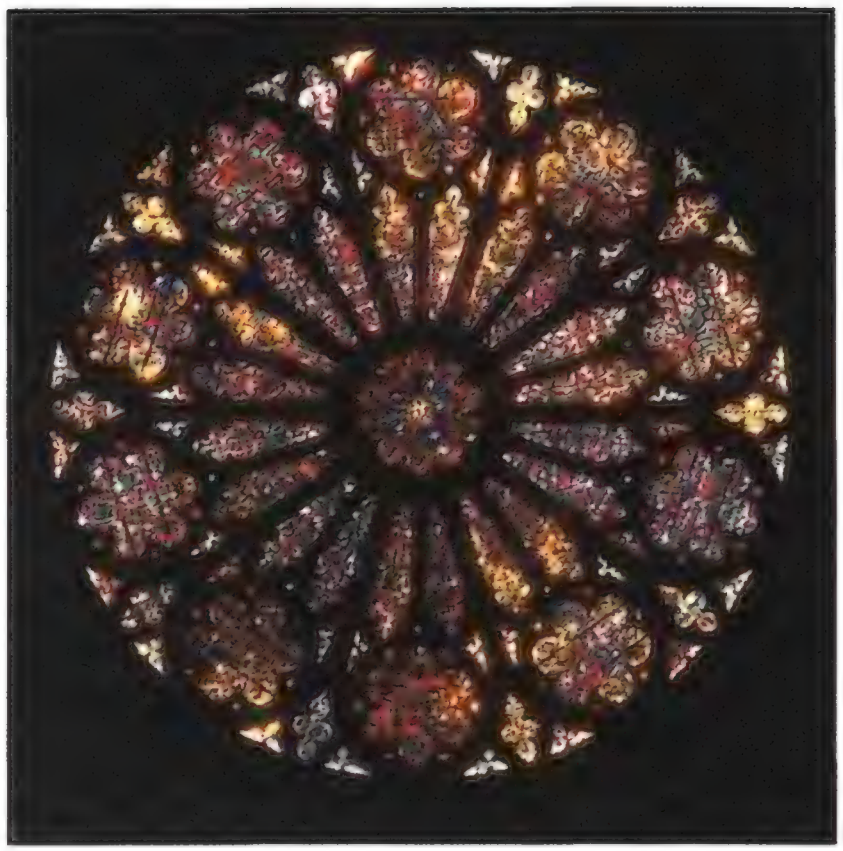
Now the Southport office is exceptional for two other qualities: the most dramatic turnaround and the most outstanding manager of the year.

☐ To see what Team Xerox can do for your office, call 1-800-833-2323, ext. 30, or send your business card to Xerox Corporation, Dept. 30169, P.O. Box 24, Rochester, NY 14692.

By Terence Monmaney

Complex window on life's most basic molecules

Robert Langridge's computer 'looking glass' shows chemists an Alice-in-Wonderland world of models they can fly with a joystick



Rose window at Washington's National Cathedral is a stained-glass match for symmetry of DNA (opposite).

Robert Langridge, a lanky, bearded man of 51, who is as nimble and delighted as a toy maker and game enough to fly a glider, has a knack for getting inside molecules. At six-foot-two, he can climb inside a molecule of deoxyribonucleic acid, or DNA, the genetic material—which takes the shape of a coil .00000007 inches across—without ducking his head. Then, like a guide conducting a tour through some splendid corridor, he goes on to point out some of the extraordinary features in DNA's architecture. A seasoned guide, Langridge was among the first to explore DNA's structure, and he's a pioneer in the field of computer graphics, which opens up the strange territory of molecules for others to explore.

Smiling mischievously, Langridge, the director of the Computer Graphics Laboratory at the University of California, San Francisco, says that this computer-generated picture of DNA also conjures up the inside of someplace else. "When I first saw the DNA end view, it reminded me of a rose window." The dots of blue, red, green and yellow do look like tiny chinks of stained glass. And viewed from the end, the colored dots and lines do take the shape of a rose window, a kind of high-tech daisy with ten petals. Yet rose windows generally have eight or 12 or 16 panels—rarely ten, like DNA. But Langridge found such a window at the National Cathedral in Washington, D.C. "The window has exactly the tenfold symmetry of DNA, which is the genetic material in all living things," he observes with a look of utter delight, "and, remarkably, it represents the first part of *Genesis*, the Creation."

"No," he says later, shrugging off the weighty idea. "I don't see any deep religious significance there. Just that people enjoy looking at beautifully colored symmetrical structures."

Langridge's pictures of DNA catch the eye—they have appeared at scientific conferences and on the *Today* show, on the cover of journals and in *Star Trek II*. But the computer can generate exquisite models of hundreds of other biological molecules besides DNA. There is insulin, for example, the protein that spurs the breakdown of sugars in the body, and hemoglobin, large and sturdy, an oak among proteins, which carries oxygen in the blood. Atom-by-atom instructions describing each one are stored in a computer bank at a laboratory in New York, all available for the ordering, a sort of L. L. Bean of molecular biology.

More than 100 molecular-graphics centers have sprung up around the world. It is a technology in bloom. Computer models help molecular biologists figure out exactly how enzymes do their jobs. Chemists use the tool for designing new drugs. And the new breed of molecular engineer uses the computer as a kind of drawing board on which to redesign the very stuff of life—hormones, enzymes and DNA itself. "Essentially," explained Douglas Ohlendorf while doing biotechnology research at Genex, "you're extending your senses down to the atomic level."

It was four decades ago that Linus Pauling and Robert Corey, chemists at the California Institute of

Langridge adjusts stereo viewing device used with his computer to show molecules in three dimensions.

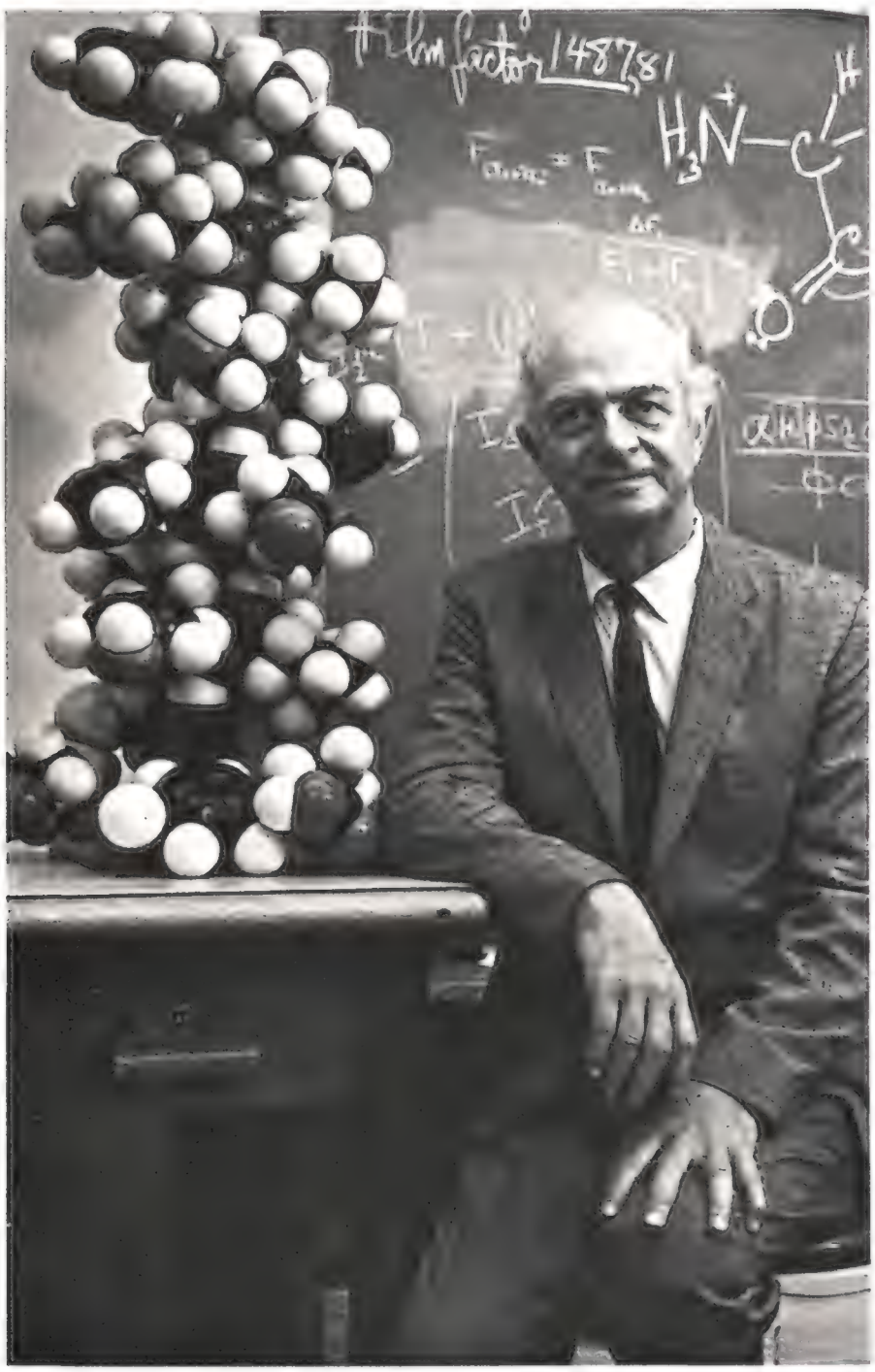
Projected in background, the image of DNA—seen down its axis from one end—reveals ten-part symmetry.

Technology, built those knobby plastic models (p.116) now as common in chemistry labs as skeletons in anatomy labs. Those models made handy the idea that the shape of molecules determines how they work. You could hold a model of, say, water, H-O-H, and analyze it like a jeweler inspecting a gem, maybe get a feeling for how they stack up in an ice cube. But a protein or nucleic acid, with thousands of atoms apiece, calls for a model the size of a phone booth, which is not only tough to handle but frustrating to build—typically demanding that parts are attached with an error of no more than .004 inch. And space-filling models have another drawback, as Langridge wryly demonstrates by showing off a waist-high model of DNA that years ago collapsed into a heap of plastic knobs. "Space-filling models are notoriously subject to gravity," he says.

On the computer screen, DNA sparkles. Nudging the joystick, Langridge sets the model in motion and peers through a stereo viewer that makes the molecule seem to float in space. Its symmetrical face turns and the long double helix, previously out of sight, swings into view. From the side, one sees the ridges in the helix that are pitched like threads in a wood screw, an architectural feature that chemists take into account when designing drugs to switch off DNA's protein-making machinery—a prominent strategy in developing drugs that fight cancer. Langridge zooms in on the DNA model. He pilots his way into its farthest corners. New perspectives open up with a nudge. It is as if by tilting a Vermeer canvas you could suddenly gaze out the window onto the Dutch landscape.

The sensation is so odd it does inspire strange talk. Around the graphics lab they speak of swimming with, getting inside, riding, docking, even flying molecules. (In fact, David Pensak, working with the drug-design group at Du Pont, says he's thought about getting a flight simulator for scientists to work with.) Sitting across a table from Langridge, Nagarajan Pattabira-

James Watson (left) and Francis Crick used this wire model to work out the structure of the DNA molecule.



Linus Pauling designed the knob models that helped chemists consider the 3-D structure of molecules.

man, a postdoctoral fellow, is trying to explain that merely looking at two-dimensional pictures of molecules is a hollow experience compared with handling them on the computer screen. "You can look at slides and movies and so forth," he says, "but the complete sense is there only when you interact with the molecule—only when you touch it."

"I hadn't thought of touching the molecule!" Langridge says. "I *like* that. It's as if you put your hands on it—it really is there."

This is perhaps a strange enthusiasm for a man who never took a college course in chemistry. "I've got huge gaps in my elementary chemistry," Langridge says. "It's always embarrassing when a colleague sits down and starts pushing electrons around on paper and I say, 'What the hell is this?' Well, I take their word for it. They take mine." And he adds, "The best way to have fun in science is to do something you're not trained for."

Growing up in tiny villages in his native England, Langridge considered becoming a professional pilot and, as a teenager, took flying lessons with the Royal Air Force. Lately he has taken up gliding again, after having tried ocean sailing but finding the sea, well, too flat. "You're just on the surface of things," he says. "It's too two-dimensional."

Into the wild blue yonder of computers

Computer graphics, though, are so vividly three-dimensional that Langridge usually starts his story with a word of caution. "It's extremely easy when you're using computers to go off into the wild blue yonder and lose contact with the real world," he says at the beginning of a slide-illustrated talk, and adds, to tether his students' imaginations, "so the first slide I'm going to show you is *data.*"

The slide he shows certainly looks like data: grainy black splotches against a white background, about as picturesque as an inkblot. Yet this photograph made with x rays is raw material for the dazzling full-color picture of DNA on the computer screen, and, what's more, it's a kind of scientific icon. Just such a photograph gave an important clue to James Watson and Francis Crick, who in the spring of 1953 in Cambridge, England, solved the puzzle of DNA's structure.

Watson, then 25, for his part in the discovery supplied vigor and an interest, inspired by Pauling, in building models. In a lab on the Cambridge campus, he'd fuss with pieces of cardboard cut roughly to the shapes of the chemical pieces of DNA, puzzling how they might fit in a way that didn't break the rules of chemistry. And Crick, a restless 37-year-old physicist, correctly interpreted data that had come from a rival lab in London, at King's College. There, Maurice

Wilkins—soon to be Langridge's boss—and Rosalind Franklin were also pursuing DNA's structure. But it was Crick and Watson who saw in Franklin's notes and blotchy photographs of DNA the clues for the crucial facts about it that led to the revelation of the molecule's structure.

The model Watson and Crick came up with—the chemical units of DNA arranged along two strands like the rails of a ladder, the whole thing twisted into a double helix—was so powerful because it suggested immediately how the actual shape of DNA accounts for its genetic function. When a cell divides, the double helix opens up, with half of the helix going to each new cell, thus passing genetic information from generation to generation. Watson, Crick and Wilkins later earned a Nobel Prize for the discovery, which was hailed as the "secret of life."

To a young physics and mathematics student at University College, Exeter, who was at the time considering a career in nuclear physics, the discovery seemed less than portentous. Still, a recruiting notice from Maurice Wilkins on a campus bulletin board got Langridge thinking about a change of plans, and in 1954 he went to Wilkins' group in London to do graduate work on, as he recalls it, "some stuff called DNA." There he ironed out a few wrinkles in the model of DNA by using that curious technique of passing x rays through a fiber of DNA and recording on film how the DNA diffracts, or bends, the x rays; but the result of that onerous job, a blotchy x-ray diffraction photograph, is yet a long mathematical journey from becoming a precise molecular model.

Imagine trying to build an exact model of an elaborate cut-glass goblet by analyzing all the sparkles it makes on a tablecloth: you'd have to take hundreds of photographs of sparkles in all their configurations, make thousands of calculations to combine the two-dimensional photographs and relate them to the goblet's structure. In the end you'd have a long list of numbers that names each cut in the glass and assigns it a position in three-dimensional space. Such a list of coordinates is what a person or a computer converts into a three-dimensional model.

"And the calculations would take, for a typical model of DNA, about two weeks," Langridge says of his work in the 1950s. "And it was very boring, to say the least." In 1956 Wilkins' group got access to one of the first IBM computers in London, and Langridge programmed it to solve all those equations. Calculations that had taken two weeks to complete could be done in a half-hour. "*Now*adays," he says—and snaps his fingers.

Terence Monmaney, who has worked as a biochemist, is currently a staff writer for Science 85 *magazine.*

A new generation of models uses computer graphics to simulate interaction of DNA with protein molecule.

When he arrived in the States, in 1957, hardly anyone was using the computer to do calculations, let alone generate bizarre-looking pictures of molecules. It was several years later, while doing research at Harvard Medical School, that a particular late-night phone call stirred things up.

Across Boston, at the Massachusetts Institute of Technology, biologist Cyrus Levinthal was coaxing MIT's big new computer, which had a small black-and-white screen, to draw scraggly pictures of proteins that could be moved around in three dimensions. It was 1964. "Cy called me up and asked, 'Do you know of anybody working with systems like these?' Of course I didn't because there weren't such systems. My first question was, 'When can I come over?' "

From the looks of it, their meetings went well. Langridge and his colleague Andrew MacEwan made some computer models of DNA, and those, along with Levinthal's earlier models of proteins, were the first of their kind. They were, by today's standards, crude first efforts, so that a single model of a protein, with its hundreds of chemical bonds drawn with white lines, looked like a pile of twigs. Today's color pictures clear up that confusion—oxygen is red, nitrogen blue, carbon green, and so on. But these have failings, too. Gaudily colored models are known as Christmas trees.

Most researchers, though, daub electronic magenta or yellow or green onto a model's framework with enough good taste to have earned for this technology the nickname "painting by numbers." And while some researchers complain there's no place for painting in

hard science, clearly the computer lights up the nature of molecules as never before. Elizabeth Getzoff, now at the Research Institute of Scripps Clinic in La Jolla, California, says the UCSF computer graphics shed new light on the business end of an enzyme that may be in the body's front line of defense against cancer and aging. The enzyme, she says, breaks down "superoxide"—a molecular form of oxygen known to be toxic. "Looking at the graphics we saw the enzyme had a long deep channel with a pocket at the end, where a superoxide molecule fit in," she says. "Seeing that helps us understand how it works."

At pharmaceutical companies, new molecular design departments are banking on computer graphics to speed up the otherwise slow and arbitrary search for an effective drug, and that way trim the $50-to-$70 million bill that comes with producing one. (Consider that after the first sulfa drug was discovered, chemists had to test more than 5,000 more sulfur compounds to find fewer than 20 that were good germ killers.) Computer models of potential drugs help chemists narrow the field more quickly. Scientists at G. D. Searle say they've developed a novel painkiller, from scratch, with help from the computer graphics. At Merck Sharp & Dohme Research Laboratories, computer graphics have helped chemists polish up their work on a drug that's intended to keep blood pressure low.

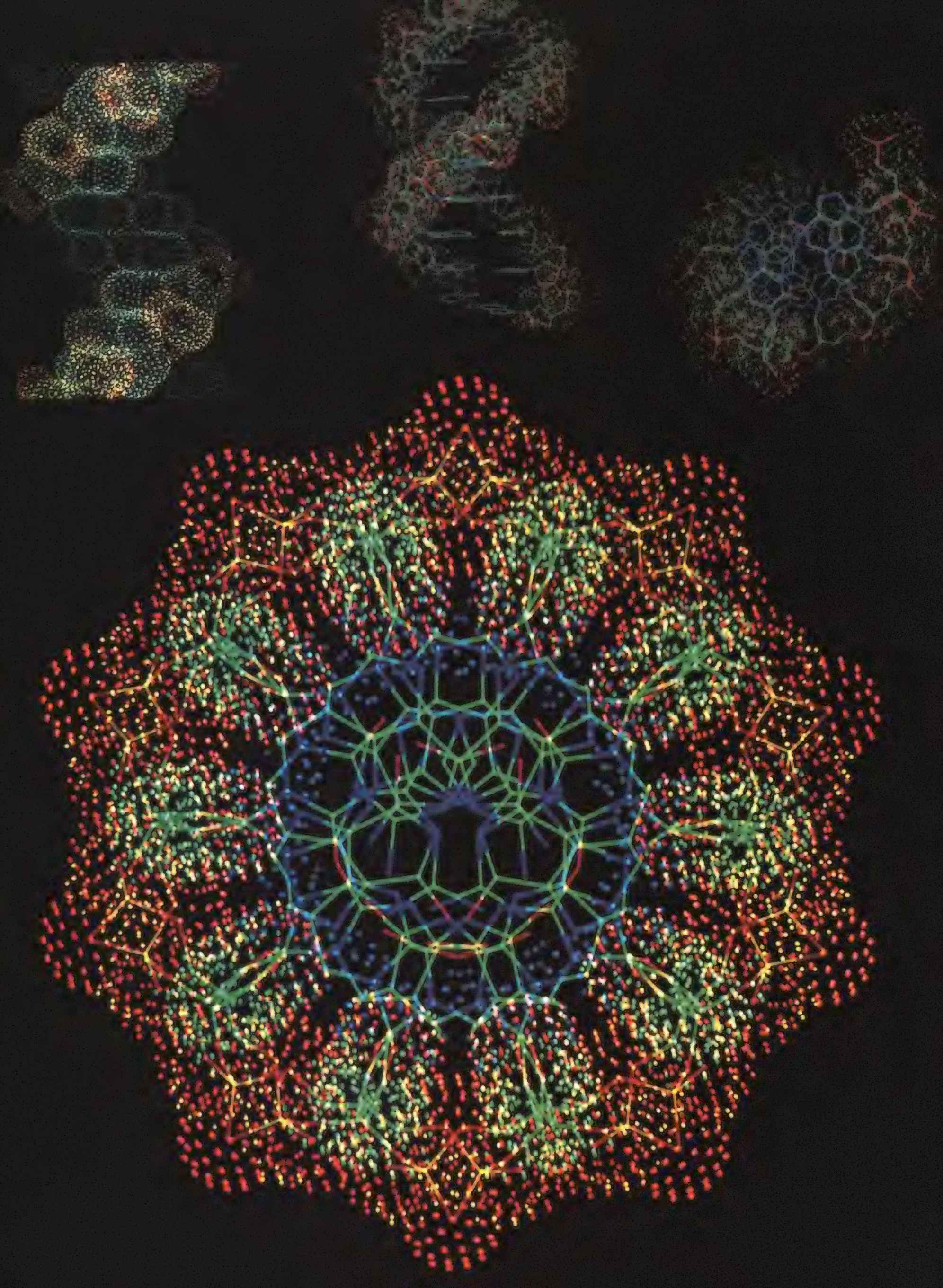
The wish list is getting longer all the time—and includes not only new drugs but also new vaccines, chemicals for paints, compounds for computer chips, and any other substances that need to be tailor-made for a specific job. So far, though, as Pensak points out, no drug or chemical designed by computer is on the market. "Computer modeling has been tremendously oversold," he says. But Pensak foresees that as the tool gets simpler and more widely used, it will lead to something deeper, longer lasting than new substances —a new way of thinking. "Chemistry has not changed substantially in the past 150 years," he says. "But because of computer modeling, the time is coming when an experiment that fails will give a scientist as much information as one that works."

Langridge, looking out the window of his office on the tenth floor—taking in the view of Golden Gate Park, the mouth of San Francisco Bay and, way off, the headlands of Marin—admits that these days he is more administrator than experimenter. He leaves most of the programming to young hotshots like Michael Connolly, now at the Scripps Institute, and Conrad Huang, who joined the graphics lab while a high school student and still works there while doing graduate study in computing at Berkeley. And Thomas Ferrin, an engineer, takes care of the whole system. Langridge, meanwhile, is heading off into other fields, including artificial intelligence, and also traveling a lot, giving talks, showing slides of molecular models that elicit oohs and ahs from even the most hardbitten chemists.

"Langridge is the P. T. Barnum of molecular biology," one scientist says. Indeed, at a party he might pass around a small cardboard contraption for viewing a 3-D model of some molecule, the bright lines and dots describing a kind of miniature landscape the way streetlamps and lighted windows configure the roll of the Earth when seen at night from an airplane.

"What we need is imagination," the physicist Richard Feynman once said, "but imagination in a terrible straitjacket." These exquisite images—unlike, say, computer graphics used in movies—are wrapped up tight in data. "Numbers are sacrosanct in science," Langridge says, "but when you're looking at structures as complex as proteins and nucleic acids, numbers alone won't convey anything. You've obviously got the numbers here. That's what puts the pictures on the screen. I don't know of a quantitative way to say it: what you do with this is gain insight." He pauses. "You start talking about insight and intangibles and sort of feeling it—people say, Huh? But that's as important, if not more so, than the hard numbers. The advantage of graphics, of course, is you've got both."

Different aspects of DNA appear as it is moved around and modified on Langridge's computer system. At top left, a section of the whole molecule is seen from the side. In middle, we see inside as connective atoms are stripped away to show the double-helix skeleton. At right, molecule is tilted over so that we peer down the axis of intertwined spirals from the top. Below is a flattened, two-dimensional version of the same view from top, revealing DNA's tenfold symmetry.



Mon.

Tue.

Thur.

Fri.

The week Newsweek readers began firing at Will.

The week was January 12th, 1976. The subject: "Knute Rockne for President."

It was George Will's first column for Newsweek. And as he compared the histrionics of a pregame speech to the hysteria of pre-election politics, a new generation of readers was born. Readers who have a peculiar habit of reading our magazine backward. (From the back page, where George's column appears, forward.)

His witty, erudite style has earned him the respect and loyalty of a large (but split) audience: those who love him, as well as those who love to hate him.

Alternating with Meg Greenfield, our other national-affairs columnist, Will hits on a wide range of subjects: from the future of American politics to the future of the Chicago Cubs.

His column is the continuation of one of Newsweek's boldest innovations in newsweekly journalism: the concept of signed opinions. Pioneered

© NEWSWEEK 1985

Wed.

Sat.

with Raymond Moley's first "Perspective" column in 1937. And continuing through the years with voices as calm as Walter Lippmann and as impassioned as Stewart Alsop.

In addition, Newsweek introduced the first newsweekly columns on business, economics and sports, the first column authored by guests and the first signed criticism of the arts.

Will and Greenfield have garnered top honors. Both are Pulitzer Prize winners. And both have been notable figures in the National Magazine Awards.

In fact, Newsweek staffers have won over 600 awards for excellence in journalism. More than any other newsweekly.

Which brings us to our point: when a magazine starts striving for excellence, where there's a Will, there's a way.

Nobody gets you into the news like

Newsweek®

After attacks on French ships, German poster made Churchill an evil figure enjoying deaths of Frenchmen.

Scene of battle is marked by sinking ships, columns of smoke, geysers of water tossed up by British shells.

By Alistair Horne

Mers-el-Kebir was a bizarre and melancholy action

In July 1940 the British Navy blasted a French fleet near Oran, and may very well have changed the course of World War II

On July 3, 1940, for the first time since the age of Nelson, ships of the British Navy and the French Navy found themselves locked in bitter warfare. British shells weighing as much as a two-door sedan slammed down on French armor plate; near-misses hurled up great geysers of water from the tranquil blue Mediterranean, which after a few grim minutes was cloaked with the oily black smoke of battle.

France and Britain had been solidly ranged together against the might of Germany in two World Wars. Only a few weeks earlier the two Allied armies were fighting side by side to parry Hitler's devastating blitzkrieg into France. Yet the most powerful units of the Royal Navy were now relentlessly pounding French warships sheltered in their North African base of Mers-el-Kebir.

It was an act that engendered French rage, brought joy to Adolf Hitler, provoked distress in Britain and outrage around the world, and would profoundly affect the course of the war against Germany. It was an act, too, that Winston Churchill, the man who ordered it, would describe as "Greek tragedy," adding "But no

The firing lasted only ten minutes, but the French lost 1,200 men and had four ships put out of action.

Sign of French outrage at the attack shows in poster of drowning sailor and caption: Remember Oran!

act was ever more necessary for the life of Britain."

How this all came about is an extraordinary story, in which elements of desperate resolve, anguish, confusion and profound ill chance all played a part.

In September 1939, Britain and a reluctant and unprepared France had gone to war with Nazi Germany after the invasion of Poland. Months of "Phony War" followed, but on March 28, 1940, the British and French governments signed a solemn obligation that neither would seek a separate peace with Hitler. Then, on May 10, Hitler's Panzer divisions smashed the French at Sedan, splitting the Allied armies and driving the British forces back to the sea. Their remarkable escape at Dunkirk was greeted as a miracle in Britain and America but to many Frenchmen, reeling back in disorder and soon to capitulate, it seemed an act of historic desertion by perfidious Albion.

By mid-June Premier Paul Reynaud sent Churchill a request to be released from the March commitment not to sign a separate peace. Paris fell on June 14. Two days later, eager to stiffen French resistance, Churchill made two dramatic replies, one setting terms, the other offering encouragement. According to the first message, Britain would agree to France's making inquiries about German peace terms, "provided, but only provided, that the French Fleet is sailed forthwith for British harbours pending negotiations." It went on to stress that Britain intended to remain in the fight against Hitler, however hopeless the odds might seem. That same day, urged on by de Gaulle who insisted that some "dramatic move" was essential if France were to be kept in the war at all, Churchill offered France a historic proposition: "indissoluble union" with Great Britain.

By then the French government had been evacuated to Bordeaux. When the first message arrived, Reynaud was in a dejected mood. But Churchill's offer of union stirred him. For a document like that, Reynaud declared in reply, he "would fight to the last." To make things easier for him, Churchill promptly sent an order to "suspend action" on the previous demand for neutralizing the French fleet as the British price of agreeing to a separate armistice.

The history of conflict, whether between individuals

Just before attack, French ships lie calmly at anchor along harbor jetty, from left: *Dunkerque, Provence, Strasbourg, Bretagne, Commandante Teste.*

or nations, is often determined by misunderstandings, based on failures of communication in moments of crisis. And it was at this juncture that the first of a series of tragic misunderstandings occurred. As passed to the beleaguered Reynaud, the British counterorder read "canceled" as opposed to "suspended," a delicate distinction, perhaps, but one that Churchill later thought might have led France to underestimate the gravity with which Britain viewed the fate of the French fleet.

In Bordeaux that day, Churchill's offer of union was treated with hostility and mistrust, if not contempt, by the majority of French leaders. In an atmosphere of defeatism, the 73-year-old commander in chief of the French Army, Maxime Weygand, declared that within three weeks "England will have her neck wrung like a chicken" (a memorable line which enabled Churchill eventually to make his famous defiant riposte: "Some chicken, some neck!"). Marshal Philippe Pétain damned the British proposition as offering "fusion with a corpse." But Churchill's earlier communications about the fleet were never collectively considered by the collapsing Reynaud Cabinet.

On the evening of June 16 Reynaud resigned, making way for Marshal Pétain, the 84-year-old hero of the Battle of Verdun in 1916, but now an out-and-out defeatist. Next day Churchill renewed demands that the new French government not deliver over to the enemy "the fine French fleet." The settled view at Bordeaux by now, however, was that sailing French ships to Britain would be futile; if Britain was indeed going to have her "neck wrung" in short order, the fleet would only end up in Hitler's pocket anyway. On the 18th First Lord of the Admiralty A. V. Alexander, and Adm. Sir Dudley Pound, the First Sea Lord, were urgently dispatched to France to intervene personally with Admiral Darlan, the commander in chief of the French fleet. According to Churchill, "they received many solemn assurances that the Fleet would never be allowed to fall into German hands." But it was noted that Darlan made no effort to move more French warships "beyond the reach of the swiftly approaching German power."

On June 22 France signed an armistice with Hitler, in the famous railway carriage in the clearing of Compiègne Forest. Under its terms Pétain had agreed that "The French war fleet, with the exception of that part permitted . . . for the protection of French interests in its colonial empire, is to be assembled . . . and disarmed under German or Italian control." There had been much talk about *l'honneur* during the negotiations, but—as seen from London—France had done nothing to honor its March commitment or to allay British fears about the French fleet.

How justified was Britain's anxiety? Like the U.S. Navy of that period, the strength of the Royal Navy was based on the "two power standard"—meaning that it should be superior to the combined strengths of any two likely adversaries. As of 1940 Britain still had the world's biggest navy. But it had already taken a battering in North Atlantic convoy duty, in the ill-fated Norwegian campaign and at Dunkirk. Its line of heavy units had

Winston Churchill felt tragic decision was "necessary for life of Britain."

Historian Horne, the author of many books including To Lose a Battle, France 1940, *is writing the official biography of Harold Macmillan.*

Why use replacement doors when you can have Pella Improvement Doors™?

The trouble with most replacement doors is they're not enough of an improvement.

That's why the people who invented Pella Improvement Windows™ now present Pella Improvement Doors. So you can open up a world of beautiful possibilities for style, convenience and energy savings.

Choose from a large selection of impressive sliding glass doors that glide effortlessly on rollers, Contemporary French Sliding Glass doors sized ideally for replacing inefficient older doors, and more. Make a grand entrance with Pella Traditional French Doors, especially when you add energy-saving Type E Slimshade® blinds between the panes of insulating glass. Or add sturdy wood windowpane dividers between the glass. Enjoy the rich look of beautiful natural wood inside and out – a beautiful natural insulator. Or the easy maintenance of exterior aluminum cladding that never needs paint. Pella offers many combinations of options to meet your needs.

Not just an entry door. The grand design of Pella's Traditional French Door works solo as an entry door. Now

flank it with tall Pella Casement Windows, top it with a Pella Circlehead Window, and open up a whole new world.

Even the way you buy them is an improvement. Pella invented the Pella Window Store so you can see Pella Improvement Doors and Windows in action. Whether you're looking for a specific style or simply shopping for ideas, our experts will be glad to answer your questions and offer advice. Come find what you're looking for at the Pella Window Store. We're listed in the Yellow Pages under "Windows".

Free idea booklet!

Mail to: Pella Windows and Doors, Dept. C16G5
100 Main Street, Pella, Iowa 50219
Also available throughout Canada. © 1985 Rolscreen Co

This coupon answered in 24 hours.

Please send me a free booklet on Pella window and door ideas.
I plan to ☐ build, ☐ remodel, ☐ replace

Name _____

Address _____

City _____

State _____ Zip _____

Telephone _____

The Pella Window Store™
Windows, Doors, Sunrooms & Skylights

been stretched thin in covering the threat of German surface raiders like the pocket battleship *Graf Spee* (cornered by three smaller British cruisers and later scuttled at Montevideo at the end of 1939). On paper, Britain had numerical superiority in capital ships: 11 battleships and three battle cruisers, with five battleships building; Germany: two pocket battleships, two battle cruisers (all modern), with two battleships building. But Italy's entry into the war on June 10 had gravely tilted the balance. The Italians had a fast and modern fleet, though of unknown quality (in fact it was to prove ineffectual, something that could not be foreseen), and at least six British battleships had to be deployed to watch their six Italian opposite numbers in the Mediterranean. Nothing was left over for the Pacific where Japan was not expected to remain neutral, and Britain had no assurance that the warships of a neutral United States would protect her holdings and sea-lanes there.

Thus, for a nation and an Empire built on sea power, the loss of the French fleet to Germany would be an absolute disaster. France had the fourth largest navy in the world. It included five old battleships, two modern battle cruisers (*Dunkerque, Strasbourg*) with eight 13-inch guns, capable of standing up to Hitler's

Troubled Adm. James Somerville, photographed c. 1941, had been shown as a cruel caricature shouting "Fire!" in anti-British propaganda poster.

The map shows Mers-el-Kebir at the western end of the Mediterranean, where fatal naval action took place.

Scharnhorst and *Gneisenau*, and two powerful battleships nearing completion (*Jean Bart, Richelieu*), as well as 18 cruisers, two aircraft carriers and a number of excellent destroyers.

Today we know that in 1940 the Germans had no plan to take over the French fleet. There were not enough German sailors available and the move made little sense as long as Hitler—still nursing romantic notions about preserving the British Empire—did not want to see the Royal Navy destroyed. He thought it would be "a favorable solution if the French fleet scuttled itself," but was prepared to settle for its "neutralization" in French ports "under German or Italian supervision." None of this was known to Churchill, and had it been, it is doubtful anyone would have trusted the information.

The key figure was Adm. Jean-Louis-Xavier-François Darlan, age 58. Ever since an encounter in 1939, Churchill "thought of him as one of those good Frenchmen who hate England," and never trusted him. De Gaulle, however, insisted to Churchill (on June 23rd) that Darlan would not surrender a single ship to the Germans. Darlan himself, when he met with the two British Admiralty chiefs in Bordeaux on June 18, gave his explicit promise not to surrender the fleet under any circumstances.

Nevertheless, Article 8 of the armistice terms threw the British into gravest apprehension—especially the line "under German or Italian control." In French the root verb for the crucial word *contrôle* means to inspect, to check, to keep track of, and thus did not imply that the Germans would have actual operational authority over French ships. On the other hand, to the British "control" signified simply that Hitler would be able to dispose of the vessels as he saw fit. This difference in interpretations might have been swiftly cleared up if the principal channel of communication, British Ambassador Sir Ronald Campbell, had not just departed precipitously from Bordeaux.

Meeting on the 24th, the British War Cabinet decided "No reliance whatever could be placed upon the safeguards in this Article." Churchill's misgivings were fanned by Gen. Sir Edward Spears, until recently his special liaison officer in France, who bluntly pointed out that—whatever Darlan's intentions—if Hitler at some

later date should want the French ships, all he needed to do was threaten to burn Marseilles, or, if that didn't do the trick, put Lyons to the torch or promise to destroy Paris unless he got his way. Given Hitler's record, this was a telling argument. The French would be powerless to keep their word, even if they wanted to. Churchill's trust in the Pétain regime was not heightened when, contrary to its promise, France handed back to the Germans 400 of their pilots shot down during the Battle of France. Their return would provide a deadly bonus in the Battle of Britain.

In the atmosphere of mutual recrimination and bitterness, one more —and possibly decisive—failure of communications occurred. On June 24, in a signal to Darlan's chief liaison officer in London dealing with the possible disposition of the fleet, a vital paragraph was omitted that referred to possible withdrawal of French vessels to U.S. ports—an action that would obviously have settled British fears. In the opinion of some French historians today, this oversight—if oversight it was—may have been a direct cause of the tragedy that followed.

This omission was all the more remarkable in view of the extreme importance, to both France and England, of the attitude and possible role

France's Pétain (left) was a defeatist, while Admiral Darlan (right) swore Hitler would never get the fleet.

THE TALBOTS WROTE THE BOOK ON CLASSIC CLOTHING. NOW IT CAN BE YOURS 8 TIMES A YEAR.

Since 1947, The Talbots has offered American women the finest in classic clothing.

Now, you can bring our classic selection of Misses and Petites styles into your home, 8 times a year, by subscribing to The Talbots catalog.

Simply call toll-free 1-800-225-8200, and we'll begin your subscription promptly.

You'll be able to select a wardrobe that's simple yet sophisticated, fashionable yet timeless.

And, if you order clothing and accessories by phone, you'll enjoy the warmth and friendliness of The Talbots personalized service.

The Talbots also offers you our longstanding guarantee. If you're not completely satisfied with any purchase, you get a refund or exchange any time.

To subscribe to The Talbots catalog, just call toll-free 1-800-225-8200 and charge the $3 fee to one of your major credit cards. It's a call well worth making—because every issue is a classic.

For a one-year subscription to The Talbots catalog, including our new Fall '85 edition, call 1-800-225-8200. Or just return this form, along with a $3.00 check or money order to: The Talbots, Dept. RE, Hingham, MA 02043.

Name

Address

City

State Zip

To subscribe to The Talbots catalog, just call toll-free 1-800-225-8200.

The Talbots

Flagship of Somerville's Force H at Mers-el-Kebir was famous battle cruiser HMS *Hood*, sunk by a freak hit from German battleship *Bismarck* in 1941.

of the United States with regard to the French ships. As early as May 26, even before Dunkirk, President Roosevelt cabled Ambassador Bullitt in Paris that he regarded the French fleet as "vital to the reconstitution of France and the French colonies and to the ultimate control of the Atlantic." The French fleet, he concluded, "must not get caught bottled up in the Mediterranean."

Since—to Churchill—the French-German armistice terms confronted Britain with "mortal dangers," action had to be swiftly taken. British Intelligence reckoned that Hitler might attempt the invasion of Britain on July 8. By that date the fate of the French fleet had to be settled, and the Royal Navy redeployed in home waters. The decisive meeting of the War Cabinet took place at noon on June 27. By this time some French units were in port in metropolitan France; nothing could be done about them. Some of them were in British ports; these could be taken over by force if the crews rejected British terms. The incomplete *Jean Bart* and *Richelieu* sat in Casablanca and Dakar respectively, shadowed by British warships. They also posed no problem. The powerful French Force X, commanded by Vice Admiral René Godfroy, was based at Alexandria and under the orders of Adm. Sir Andrew Cunningham. The two men were good friends. Disregarding Darlan's orders to sail to a French base in Tunisia, Godfroy agreed not to take his ships out of Alexandria. (Force X, in fact, remained there until after the Anglo-American reconquest of North Africa.) The main threat to Britain lay at Mers-el-Kebir, a small base just west of Oran on the Algerian coast. This was Adm. Marcel Gensoul's powerful *Force de Raid*. Loose, or in German hands, Admiral Pound warned Churchill, Gensoul's ships might force Britain to abandon the Mediterranean, and thus threaten any chance of saving the Middle East, or of surviving the war at all.

By July 2 the War Cabinet offered Gensoul four alternatives:
1) Sail his ships to British harbors, and continue to fight with Britain.
2) Sail to a British port from which the crews could then be repatriated.
3) Sail with reduced crews to somewhere in the West Indies, such as Martinique, whence, if desired, they could be entrusted to United States jurisdiction for the duration.
4) Scuttle his ships.

Should Gensoul refuse all four, the Royal Navy was instructed to destroy his fleet, particularly *Dunkerque* and *Strasbourg*, using all means at its disposal. This "deadly stroke," as Churchill later called it, was pushed through by him personally despite reservations on the part of the service Joint Planners. They doubted that Operation Catapult, as the plan was called, would be completely successful. Besides, as one subsequently confided to the late A. J. Marder, the distinguished American naval historian who has written one of the most complete accounts of the British action, "it was a rushed decision and we did not like it." Churchill believed that "the life of the State and the salvation of our cause were at stake." Yet because of his long love of France it was an agonizing moment for the Prime Minister.

The unit designated to carry out Catapult had been assembled at Gibraltar in the form of Force H. It consisted of Britain's biggest warship, the 42,000-ton battle cruiser *Hood*, two battleships, *Resolution* and *Valiant*, plus 11 destroyers and the aircraft carrier *Ark Royal*, all under command of Vice Adm. Sir James Somerville, 58. Nicknamed "Naughty James" partly because of his racy language, Somerville was one of the Navy's most colorful characters, but a brilliant and humane leader. On July 1 he received instructions to carry out Catapult two days later.

The idea of firing on French ships appalled Somerville and all his senior officers, and an alternative proposition was signaled back to the Admiralty, suggesting that French units be invited to "proceed to sea," and allow themselves "to be captured by Force H." Somerville warned that offensive action by Britain "would immediately alienate all French wherever they are and transfer a defeated ally into an active enemy."

Given the awe in which Churchill was held at the Admiralty, it was a courageous line to take, and Somerville was sharply reproved. On July 2 final instructions were sent, including a personal message to be passed to Gensoul: "We are determined to fight

Give your kids a lesson they'll never forget.

If you know what's good for your kids, you'll do the smart thing.

Give them a Canon Typemate electronic typewriter.

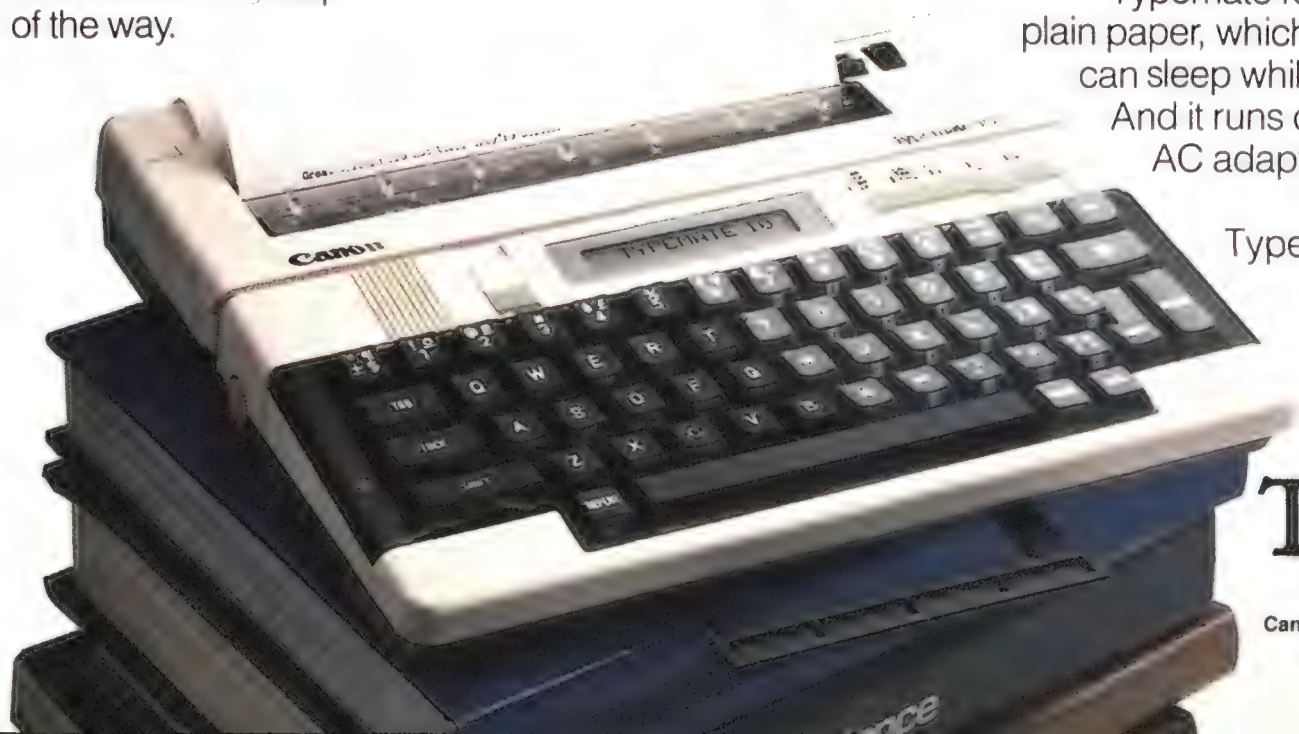
It's the only one that actually helps teach your kids to type. With three complete lesson plans built right in. And a liquid crystal display to show them how every step of the way.

Before you know it, your kids will be text editing. Storing up to 1,500 characters at a time into text memory. Setting margins, centering and more, all automatically.

And they'll be doing it on the professional keyboard of one of the most lightweight, portable typing systems ever made. Thanks to Canon electronics.

Typemate10 uses thermal transfer printing on plain paper, which makes it extremely quiet. So you can sleep while the kids burn the midnight oil. And it runs on either battery power or with AC adaptor.

So give your kids a Canon Typemate10. It'll serve them right.



Canon
PERSONAL TYPEWRITERS
Typemate 10

Canon U.S.A., Inc., One Canon Plaza, Lake Success, NY 11042
© 1985 Canon U S A , Inc

Gstaad Down Comforter
& DOWN PILLOWS

MANUFACTURER DIRECT

A year-round down comforter named for the famous Swiss ski resort Gstaad (pronounced stad). The silky smooth fabric is imported European 100% cambric cotton (226 per inch thread count). The exclusive ring stitch design has many more intricately hand-sewn circles than other ring stitch designs (180 rings in a Queen size comforter to be precise). Thus, we achieve a beautiful sculptured effect. The ideal solution for year-round sleeping comfort... nestled under the luxury of the finest European down and the irresistable feel of soft 100% cambric cotton. **Our Guarantee:** If for any reason you are not completely satisfied with your purchase, please return it for a full refund. Delivery: We ship within 24 to 48 hours.

TO ORDER CALL TOLL-FREE
1-800-356-9367, Ext. H415, or use the coupon. Or, call or write for your free catalog featuring 20 down comforter styles, down pillows, designer down coats, 100% Merino Wool products and many other natural products designed to improve the quality of your life.

The Company Store™

Gstaad Down Comforter

Color: Pure White
☐Twin (60" x 86") $99
☐Queen/Full (86" x 86") $124
☐King (102" x 86") $149

Soft Down Pillows

Colors: ☐*White* ☐*Light Blue* ☐*Beige*
☐Standard (20" x 26") $35 Two for $68
☐Queen (20" x 30") $45 Two for $88
☐King (20" x 36") $55 Two for $108

ORDER BY PHONE TOLL-FREE
1-800-356-9367, Ext. H415. Use your credit card.
OR ORDER BY MAIL:
☐M.C. ☐VISA ☐Am. Exp. ☐Check
Acct. No. _____ Exp. Dt. _____
☐Send Free Catalog

QTY PRICE
_____ x $_____ =$_____
_____ x $_____ =$_____
Ship., Hdlg., & Insur.- $5 per comforter =$_____
$2.50 per pillow =$_____
TOTAL =$_____

Name _____
Address _____
City, State, Zip _____

Send to: The Company Store, Dept. H415, 1205 S. 7th St., La Crosse, WI 54601.

French Adm. Marcel Gensoul (right), refused to take the fleet to a neutral port.

on to the end, and if we win, as we think we shall, we shall never forget that France was our ally . . . we solemnly declare that we shall restore the greatness and territory of France."

On the afternoon of July 2, Force H cleared Gibraltar for Oran, and at 3 on the following morning Somerville dispatched the destroyer *Foxhound* ahead, carrying Capt. Cedric Holland as his emissary to Gensoul. Holland had lately been Naval Attaché in Paris, spoke good French, knew the French Navy well and had met Gensoul personally. But he was an ardent Francophile, and a highly strung man of 50, miserable about the fall of France, who, though devoted to his wife, had recently been emotionally involved with an attractive Frenchwoman. Beyond that he had deep misgivings about the virtue of his mission and its chance of success. He confided to his wife the view that Admiral Gensoul was "a pig-headed old dug-out."

Whatever he was, Gensoul, 59, at least claimed to be "100 percent pro-English." At the same time he was a proud officer known to play the game rigidly, according to the rules, and unreservedly loyal to Darlan. He was put out that Somerville had sent a mere captain, rather than coming himself, and at first claimed to be too busy to receive Holland. He also took umbrage at a radio signal sent from *Foxhound*, containing a sentence (which, under the circumstances, could hardly have been less fortunately worded): "A British Fleet is at sea off Oran waiting to welcome you."

With *Foxhound* anchored off Mers-el-Kebir, and the French fleet lying inside the harbor, Gensoul sent his flag lieutenant, Bernard Dufay, an old friend of Holland's, to deal with him. Holland explained that his message could only be relayed in person to the Admiral. Gensoul replied by ordering *Foxhound* to "clear off at once"; whereupon Holland, with great daring, pretended to be complying but in fact quickly climbed into a small motorboat and headed at top speed for Gensoul's flagship, the *Dunkerque*. Holland again failed to see Gensoul, but he kept on trying, and at least was able to communicate the Admiralty terms to him. These Gensoul signaled to Darlan. But in yet one further tragic failure of communication, he omitted Alternative 3—i.e., the possibility offered by the British of sailing his fleet to the West Indies. Later severely castigated for

Unhappy go-between, Cedric Holland never recovered from heartbreaking role.

All this (and more!) fits into the Lands' End Solo Voyager.

(It measures 22" x 19" x 7")

It's a carry-on bag. It's a wardrobe, too. It has a spacious double-zippered compartment you can open on each side. Frankly, it may be the only piece of luggage you'll ever need.

We planned it that way, even though we make one of the most complete families of soft luggage items around—50 different styles and shapes and sizes last time we counted—all designed to travel compatibly together to meet the needs and whims of millions of Lands' End's fussy customers.

The need for Solo is self-evident.

For those times when you travel fastest traveling alone, you'll need a bag with a forgiving capacity—since, like us, you'll probably always overstuff it. Solo is made of Square Rigger cotton canvas, which makes it tough enough to handle all that. Yet the bag has shape because we line it with 3 oz. vinyl. Inner seams are bound, outer seams welted with leather. This bag simply won't come apart.

Finally, Solo is not only great for *what can fit into it* but also for *what it will fit into.* Closed it fits nicely into overhead compartments. Opened to wardrobe length, it can shoulder into even over-crowded plane closets.

All this, plus carrying strap, leather shoulder pad, and a leather luggage tag for only $120. In Navy, Tan, or Burgundy. Your monogram adds just $5 more.

Now a "dress-length" Solo.
No chauvinists, we: Our Women's Solo Voyager opens to a length of 50 inches to protect dresses and overcoats. It has everything the men's model has plus an extra nylon zippered pocket. $135, and for $5 more it wears your initials.

Both are on view—as is all our other soft luggage—in our newest Lands' End catalog. Send for it (or phone for it) and page through it to see the hundreds of other items we're offering you to meet and greet the season. Everything from sport clothes, to sweaters, to shoes, shorts and shirts—not to forget some mighty attractive traditional dress clothing.

Great values, all in the best Lands' End tradition by which we 1) make a quality product; 2) price it fairly; 3) ship it immediately; and 4) GUARANTEE IT. PERIOD.

Try us today. Send in the coupon, or better still, dial our toll-free number 800-356-4444 and discover that with us, "night and day, you are the one."

LANDS' END®
DIRECT MERCHANTS

of fine wool and cotton sweaters, Oxford button-down shirts, traditional dress clothing, snow wear, deck wear, original Lands' End soft luggage and a multitude of other quality goods from around the world.

Please send free catalog.
Lands' End Dept. B-03
Dodgeville, WI 53595

Name _____

Address _____

City _____

State _____ Zip _____

Or call Toll-free:
800-356-4444

Getting about

on a Fortress Scientific 3-wheeler is a whole new fun way of life...

The Fortress Scientific Model 2000 FS 3-wheeler will take you anywhere — around the house, to visit friends, to the shopping mall. Reliable, affordable and safe transportation on all types of terrain, including grass, sand and poorly-paved areas. Travels easily up inclines. Single hand controls speed, steering and braking. The 2000 FS operates on batteries which allow you to travel up to 20 miles before repowering from any wall outlet. Easily transported, the 2000 FS disassembles in minutes for storage in your car trunk.

Medicare and Private Insurance Reimbursement Available

CALL TOLL-FREE
1-800-331-1750
ask for operator #700
*Home Demonstrations Arranged

FORTRESS SCIENTIFIC
A NORTHERN FORTRESS COMPANY
137 Bridgeton Avenue
Bridgeton, N.J. 08302

☐ I would like to learn more about the Fortress Scientific Model 2000 FS Three Wheeler.

NAME: .....
ADDRESS: .....
CITY: ..... STATE: ..... ZIP .....
TELEPHONE: 1042-C

Black smoke rises from French vessels struck by British shells at Mers-el-Kebir.

this omission by the French authorities, Gensoul's explanation was one of Gallic pride: he found it impossible to accept any such proposition while being menaced by British guns.

Meanwhile negotiations were not helped by the advent of British planes from *Ark Royal* dropping magnetic mines offshore to prevent the French fleet from leaving port.

Up to July 3, and despite the fall of France, life aboard the French ships had gone on much as usual. The British force was first sighted early on the 3rd by a 26-year-old ensign, Maurice Putz, who was leading a physical recreation group up the steep hill behind Mers-el-Kebir. From there they glimpsed ships approaching from the west. Soon the familiar silhouette of HMS *Hood* (with which many of the French units had served on Atlantic patrol) was recognized. There was consternation back aboard *Dunkerque* (where Holland was still pressing for a direct talk with Gensoul) when fleet orders were given to "prepare for combat." On the second meeting of Holland and Dufay, Gensoul ordered all boilers lit.

IF YOU ARE 60 OR OVER SAVE 25 PERCENT AT SHERATON WORLDWIDE

Sheraton's 25% discount* is good at over 400 luxurious hotels, inns and resorts worldwide. And it's yours from the day you turn 60.

You can even bring the grandkids at no extra charge. Under our Family Plan, children 17 and under stay free in your room if existing bedding is used.

So take advantage of the savings at Sheraton, with a full 25% off. There's no warmer welcome worldwide.

*Discount applies to all but minimum rack rates. Advance reservations required. Subject to availability at participating Sheratons.

For reservations call your travel agent or toll-free **800-325-3535**. Say you're 60 or over, and ask for the 25% discount. At check-in, present your driver's license or any proof of age.

Sheraton
Hotels, Inns & Resorts Worldwide
The hospitality people of ITT

White geysers of water mark missed shots in a picture taken from town of Oran.

The hours dragged by. Aboard the British ships, Somerville worked innumerable crossword puzzles, and senior officers on *Ark Royal* kept up a running game of Mah-Jongg.

By 4 P.M. Gensoul finally received Holland face-to-face. For an hour and a half they negotiated inside a stifling cabin. At first Gensoul was extremely angry, then became more conciliatory to Holland personally. He revealed to him Darlan's orders dating from June 24, directing that if *any* foreign power were to try to seize French ships they should without further ado be sailed to the United States or scuttled. Holland was sickened when he realized just how close the French and British positions were. In retrospect, however, it seems that Gensoul was mainly playing for time—and, if possible, darkness—in which to slip out of the harbor. Holland did not learn until the last minute, for instance, that Darlan had instantly ordered all French warships in the Mediterranean to rally to Gensoul. It was this enciphered signal intercepted by the British Admiralty (and deciphered, presumably via Enig-

¡Speak Spanish like a diplomat!®

What sort of people need to learn a foreign language as quickly and effectively as possible? *Foreign service personnel,* that's who. Members of America's diplomatic corps are assigned to U.S. embassies abroad, where they must be able to converse fluently in every situation.

Now you can learn to speak Spanish just as these diplomatic personnel do—with the Foreign Service Institute's Programmatic Spanish Course. You'll learn Latin American Spanish recorded by native speakers.

The U.S. Department of State has spent thousands of dollars developing this course. It's by far the most effective way to learn Spanish at your own convenience and at your own pace.

The course consists of a series of cassettes and accompanying textbook. Simply follow the spoken and written instructions, listening and repeating. By the end of the course, you'll be learning and speaking entirely in Spanish!

This course turns your cassette player into a "teaching machine." With its unique "programmatic" learning method, you set your own pace—testing yourself, correcting errors, reinforcing accurate responses.

The FSI's Programmatic Spanish Course comes in two volumes, each shipped in a handsome library binder. Order either, or save 10% by ordering both:

- ☐ **Volume I: Basic.** 12 cassettes (17 hr.), manual, and 464-p. text, $125.
- ☐ **Volume II: Intermediate.** 8 cassettes (12 hr.), manual, and 614-p. text, $110.

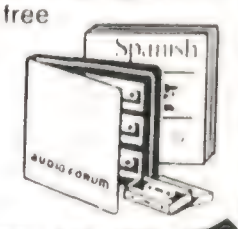
(Conn. residents add sales tax.)

TO ORDER BY PHONE, PLEASE CALL TOLL-FREE NUMBER: **1-800-243-1234.**

To order by mail, clip this ad and send with your name and address, and a check or money order, or charge to your credit card (VISA, MasterCard, AmEx, Diners) by enclosing card number, expiration date, and your signature.

The Foreign Service Institute's Spanish course is unconditionally guaranteed. Try it for three weeks. If you're not convinced it's the fastest, easiest, most painless way to learn Spanish, return it and we'll refund every penny you paid. Order today!

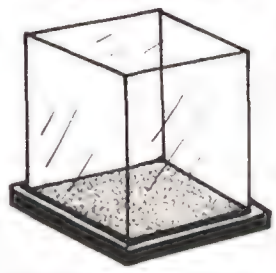
120 courses in 41 other languages also available. Write us for free catalog. Our 12th year.



Audio-Forum
Room H25
On-The-Green.
Guilford, CT 06437
(203) 453-9794

AUDIO-FORUM®

DISPLAY CASES



PROTECT AND DRAMATIZE YOUR PRECIOUS WORK OF ART

CUSTOM MADE clear lucite on a finished wood base

SEND DIMENSIONS • LENGTH • WIDTH AND HEIGHT • WE WILL QUOTE PRICE

SATISFACTION GUARANTEED
FOR ESTIMATE CALL 804-442-2299
OR WRITE

THE DISPLAY CASE CO.
Box 880B, Exmore, VA 23350

Home Study Courses

Kindergarten—8th Grade

High-quality home study courses developed by certified teachers at outstanding private school. Home is your classroom, you are the teacher. Success is easy with step-by-step instructions. No prior expenence required. Start anytime. Transfer to other schools All materials included. 350,000 student users in over 80 years Equal opportunity. Write or call for free catalog

CALVERT SCHOOL
Established 1897

Dept. S75 . Tuscany Rd., Baltimore, MD 21210
301-243-6030

MAPS MAPS MAPS

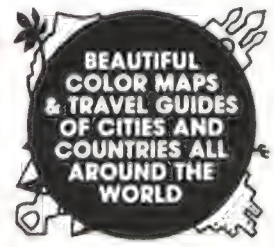
MAPS TO ANYWHERE

CATALOG

- ★ **All** the maps and guides that you need for your trip are most likely listed (over 10,000!).
- ★ Street maps, City maps, Road maps, Country, Touring, Regional, Walking, Hiking, Physical, Political, World, Continents, Atlases, Globes, Topographic, Aeronautical, **EVERYTHING**, plus 100's of Travel Guides.
- ★ 350 glorious pages, big 8½"x11" size.
- ★ **Beautiful** and **Informative.**
- ★ Numerous illustrations.

ORDER NOW

Complete 10,000 Maps and Travel Pulbications Reference Catalog
$19.95 plus **$3.50** postage & handling
Calif. residents add 6½% sales tax



TRAVEL CENTERS OF THE WORLD
P.O. Box 1673-M
Hollywood, CA 90078
"Half the Fun of a Vacation is Planning it"

MAPS MAPS MAPS

SUBURBAN GARDENERS:

At Last! A Small Tiller That Works!

©MMC 1985

Forget about big, clumsy, yank-you-along tillers . . . forever!

The Mantis tills and weeds a *sensible* 6"-9" wide (not 20" *or more* like big tillers). Mantis weighs just 20 lbs. (not 200 to 300 lbs.). Mantis' engine is so durable we give you a *lifetime replacement* agreement.

The secret is *speed.* Mantis' 36 "tine teeth" spin at 240 RPM *(twice* the speed of big tillers)! As a result, Mantis' tines go through tough soil like a chain saw goes through wood. *No jerking . . . no yanking you along . . .* and Mantis *turns* on a dime!

Most big tillers were designed to just till (but many now offer clumsy "add-on" attachments to try to justify their high cost!). The Mantis-20 was *designed from the beginning* to precisely match a small, powerful engine to a variety of *useful* attachments for your yard and garden. Tiller. Cultivator. Furrower. Edger. Lawn Aerator. Lawn De-Thatcher. Hedge Trimmer.

Most big tillers cost an arm and a leg. Despite the fact that the Mantis-20 is a tough, durable, precision instrument . . . it costs a *fraction* of what you'll pay for a big tiller.

Put the fun back in gardening. Join the move to Mantis.

SUMMER BONUS:
FREE Border Edger
(A $41 value!)

Mantis

Mantis Manufacturing Co.
1458 County Line Rd., Dept. 717
Huntingdon Valley, PA 19006

☐ Please send me more information on the Mantis-20 Tiller/Cultivator.

Name _____

Address _____

City _____

State _____ Zip _____

French ships *Provence, Strasbourg* and, farther off, *Bretagne* seen from *Dunkerque* shortly after first British salvo had set *Bretagne* afire.

ma), that provoked Churchill's abrupt order to Force H: "Settle matters quickly or you will have reinforcements to deal with."

At 5:15 an ultimatum was passed to Gensoul from Somerville. If one of the British proposals was not accepted within 15 minutes, it read, "I must sink your ships."

As the stricken Captain Holland was escorted off the French flagship, he heard the call to "Action Stations" sound. All ships appeared ready to put to sea; yet as he noted in his report, "Very little effort seemed to be being made to go to Action stations." It was as if the French still could not quite believe that the British meant business. As Holland and Dufay saluted each other goodbye, both were unashamedly crying.

Holland and his motorboat made a risky dash toward *Foxhound,* which lay directly in the line of fire. He was barely a mile off Mers when at 5:54 P.M., having delayed as long as he dared, Somerville finally gave the order to fire. At maximum-visibility range of 17,500 yards (ten miles) 36 salvos of 15-inch shells, each weighing a ton, were fired, and a terrible scene of naval destruction ensued. One of the first shells hit *Dunkerque,* shattering a gun turret, destroying a main generator and wrecking the hydraulic system. An officer who witnessed the damage said the hit "broke off some armour plating which acted as a sort of giant piston and crushed everyone in the turret to death." The old battleship *Bretagne* was set afire by several 15-inch hits. As columns of smoke poured into the sky above her, she suddenly capsized with the loss of a thousand men. Her sister ship *Provence* was reduced to a shambles and had to be run ashore. The destroyer *Mogador* had its stern blown off. But the prime British target, *Strasbourg,* was unscathed.

The French fired back, but with little effect. The gunners had not fully prepared for action and were firing on moving targets that soon sailed out of range. Nevertheless, French shell splinters actually wounded two men on HMS *Hood,* and shore-battery fire began to come uncomfortably close. At 6:04, after less than a quarter of an hour of devastat-

NEW FINDINGS ON INTELLIGENCE.

There's a new phenomenon appearing around the country—intelligent windows.

They're windows made with *Sungate*℠ coated glass from PPG. They're intelligent because they can tell the difference between sunlight (which is free) and the heat *inside* your home (which you pay for).

The secret is the transparent coating on *Sungate* glass. It acts like a gate: letting sunlight in, but not letting the heat out.

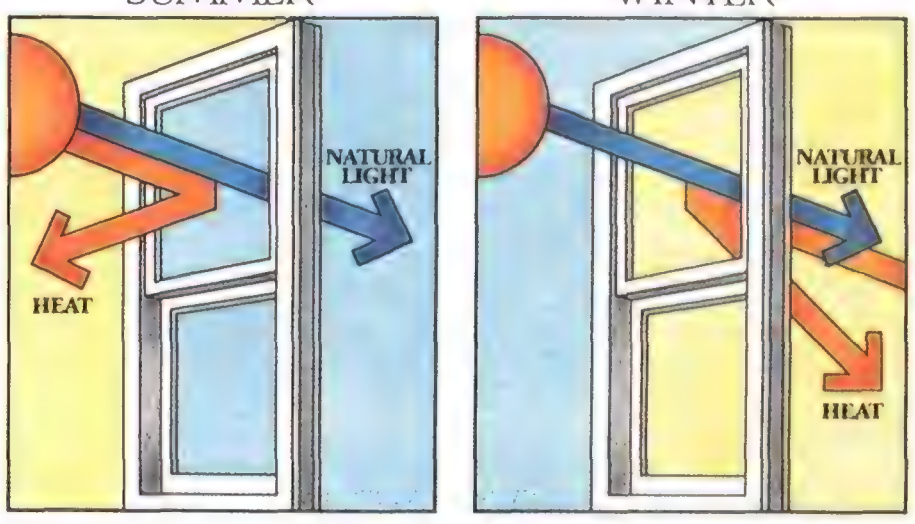
And that can save you money: more than any traditional double-glazed window ever could, and as much as bulky, expensive triple-glazed windows.

LESS FADING, BETTER FEELING, EYE APPEAL, TOO.

The coating on *Sungate* glass actually reduces the fading of the fabrics in your carpets and curtains. And The Intelligent Window™ also knows how to help eliminate condensation—and even that drafty feeling—from around your windows. For more comfort.

Best of all, *Sungate* coated glass looks like any clear window glass. So it will *fit*—not fight—your home's esthetics.

There's a whole family of *Sungate* coated glass, which includes different types for different needs. You can get all the details. Free. Just complete and mail the coupon.



Good looks, energy savings, reduced fabric fading and increased comfort. No wonder we call *Sungate* coated glass The Intelligent Window.

SC38

The Intelligent Window™
Sungate Marketing Group
PPG Industries, Inc.
P.O. Box 8727, Harrisburg, PA 17105

Please tell me more about The Intelligent Window—the one that uses *Sungate*℠ coated glass by PPG.

Name_____

Address_____

City_____

State_____ Zip_____

PPG

Most dramatic victim of British shellfire was the burning *Bretagne*, shown just as it turned over and sank in Mers-el-Kebir harbor.

ing fire, the British guns ceased. The order was given partly out of humanitarian motives, but also for more technical reasons: British ships had been sailing in line steadily westward, and now could no longer bring their guns to bear on the harbor because of high intervening cliffs.

Through the wreckage and under cover of smoke from the oil burning on the harbor's surface, *Strasbourg* and five destroyers tore at full speed past the ineffectively laid British mines and made a break for the open sea. The battle cruiser was brilliantly maneuvered and soon disappeared in the gathering dusk. It was half an hour before Somerville even realized she had escaped. After sunset, ancient Fairey Swordfish torpedo planes were sent out from *Ark Royal*—without success. The following night she reached Toulon, joined by a dozen cruisers and destroyers from Oran and Algiers. Shortly afterward, Somerville, with distaste, sent in torpedo planes to dispatch *Dunkerque*. It was unnecessary. The crippled ship would never fight again, and attack only led to a further grievous loss of life as torpedoes detonated depth charges on a trawler helping evacuate what was left of *Dunkerque*'s crew.

Thus, as its critics had feared, Catapult ended—at least in purely naval terms—as only a half-success. Sickened by what he described as a "filthy business," Somerville noted in a letter to his wife: "Afraid I shall get a colossal raspberry from the Admiralty for letting the Battlecruiser escape. . . . In fact I shouldn't be surprised if I was relieved forthwith. I don't mind because it was an absolutely bloody business. . . . The truth is my heart wasn't in it." He also characterized the attack as "the biggest political blunder of modern times," feeling sure it would rouse the whole world against England. Captain Holland was so shaken that he asked to be relieved of his command of *Ark Royal*.

In London Winston Churchill outlined this "melancholy action" to a silent House of Commons. He paid chivalrous tribute to the courage of the French sailors, but was resolute about the inevitability of the "deadly stroke." As he concluded, once again declaring Britain's determination to continue to "prosecute the war with the utmost vigor," the House erupted into one of the most sustained bouts of cheering ever recorded there. Tears streamed down Churchill's cheeks as he sat down.

In Mers-el-Kebir Gensoul buried more than 1,200 officers and men, of which 210 had died on his own ship. Outraged but powerless, the officers of the *Dunkerque* sent back "in sadness and disgust" various mementos presented them by their "chummy" ship, HMS *Hood*. The new French government's reactions were predictable. Unoccupied France severed relations with Britain. It was evidently through Pétain's restraint alone that Vichy did not swing firmly over to Hitler's side. Vice Premier Pierre Laval and Darlan both wanted to launch a surprise attack on the British Mediterranean fleet, and the latter declared himself henceforth England's sworn foe.

In Germany Hitler was delighted. The press fulminated, with the *Berliner Nachtausgabe* damning Churchill's action as "the greatest act of scoundrelism in world history." Goebbels' propaganda machine strove mightily to whip up anti-British rage in France. Grim photographs of the sinkings were published, and posters went up depicting a French sailor, his wife and newborn baby standing tragically among the wreckage, menaced by a brutal British officer, while captions exhorted "Remember Oran!" The most savage artistic effort, though, was a poster of Churchill (p. 122) as a giant, with evil face and swollen belly, gloating over sinking French ships and rows of cemetery crosses of French sailors. The impact was short-lived, however, and perhaps counter-productive. In Paris, at least, Frenchmen were soon ripping the posters off the walls. But in Britain, Catapult was nearly fatal to de Gaulle's Free French cause—French volunteers were loath to fight beside the British at all.

Of the principal actors of the tragedy, Gensoul disappeared into the limbo of history, to be retrieved nei-

BREAKTHROUGH: ADD SOUND TO JET ENGINES TO MAKE AIRPLANES QUIETER.

Two airstreams exit from a jet engine in operation—a hot, fast central core and a cooler, slower outer layer. When they mix, they become chaotic. This turbulence causes an unpleasant low-frequency rumble.

We're finding new ways to control the turbulence by adding sound to smooth the flow. The smoother the flow, the quieter the airplane. The gentle symmetry you see here could mean a quieter ride in the future—quieter for the people aboard the plane, quieter for the people on the ground below.

We're making breakthroughs not only in aerospace but also in health care, information processing and energy.

We're McDonnell Douglas.

Artist's interpretation of turbulence control test.

MCDONNELL DOUGLAS

ther by Vichy nor postwar France. Darlan was mysteriously assassinated in Algiers in December 1942 by a young French royalist. Captain Holland was eventually relieved from command of *Ark Royal*, due to fatigue, and died shortly after the war. His widow, in her 90s, maintains he never recovered from the heartbreaking role forced upon him.

Of the ships involved, the mighty *Hood* went down with almost all her crew in the 1941 battle with the *Bismarck*—her magazine exploded by a freak hit. *Ark Royal* was also sunk. The proud *Strasbourg*, like almost all the French ships that escaped from Mers, was scuttled by her crew in Toulon when the Germans invaded "previously unoccupied" France in November 1942.

One way or another the "deadly stroke" at Mers-el-Kebir left an enduring legacy of bitterness in Anglo-French relations.

Could it have been avoided? Was it necessary?

To the end of his life, Holland reckoned that the gap between Somerville's and Gensoul's negotiating positions had become so small that another few hours of talk might have worked. It is also possible that if Somerville himself had gone to Gensoul, instead of the junior and overwrought Holland, the day might have been won without bloodshed. These will remain the ifs of a moment in history to which a series of tragic failures to communicate clearly contributed. Threatened as it was with German invasion of the British Isles, Britain had no margin for error. As Marder judiciously puts it: "The British case must stand on how the situation looked to their responsible leaders *at the time* . . . on 3 July 1940, with the information available to the Government, [their] action is both intelligible and defensible."

Historically, the most important consequence of Catapult was its impact on Franklin Roosevelt and U.S. public opinion. In July 1940 Americans had been powerfully affected by Churchill's appeals, but they doubted Britain would, or could, fight on alone. One of the most influential (and voluble) witnesses *against* was Joseph P. Kennedy, FDR's anti-British Ambassador to the Court of St. James's. Consequently, in sinking the fleet of his former ally, Churchill clearly had one eye on America. As he wrote of Mers-el-Kebir in his memoirs, it "made plain that the British War Cabinet feared nothing and would stop at nothing."

Only months later did Harry Hopkins, Roosevelt's close confidant, reveal that it was above all the agonizing attack on the French fleet that had convinced Roosevelt of Churchill's (and Britain's) determination. Churchill made adroit use of the incident when urging upon Roosevelt such crucial matters as Lend-Lease. He was not above hinting at alarmist parallels with the fate of the French fleet when persuading Roosevelt that the British Navy might be handed to Hitler by an appeasement-minded British government, should Britain be allowed to fall.

If nothing else, "the melancholy action" at Mers-el-Kebir was justified by this vital commitment of the United States to the British cause in the war against Hitler in the summer of 1940. Without it, the history of Britain, and of the world, would probably have taken a very different course.

Admiral Gensoul, backed by French sailors, spoke over coffins of French dead. "If there is a stain on a flag today," he declared, "it is certainly not on yours."

Olden Goldies

Quebec City, Quebec 1-800-443-7000 Eastern States only

Vancouver, British Columbia
1-604-387-1642

Come relive our memories of days gone by. Historical sites and villages, old world cities and new found treasures of our past are alive and thriving in Canada. From the only walled city in North America, to customs, pageants and traditions that live on we'd like to play host to your trip through our past.

It's no surprise that more visitors step back into Canada time and time again where the American dollar enjoys a remarkable premium – as much as 30-35% extra at financial institutions.

Surprise yourself with a Canadian vacation. For information, check the phone numbers in the picture captions, or call your favourite travel agent. It's a memory you'll always treasure.

Canada

The Endless Surprise

Every time you go, you discover a new pleasure.
It could be one of The Homestead's three championship golf courses, or our tennis, or catching your first trout of the season. It could be breakfast in your room, or our luncheon buffet. Or it might be riding horseback over miles of well-groomed trails. Your travel agent can help you discover—or rediscover—the pleasures of The Homestead. Or call us toll-free: 800-336-5771; in Virginia, 800-542-5734.
THE HOMESTEAD.
Hot Springs, Virginia 24445

Book reviews

John Masefield's Letters from the Front 1915-1917
Edited by Peter Vansittart
Franklin Watts, $18.95

At the outbreak of World War I, English poet John Masefield, 36 and already famous on both sides of the Atlantic, volunteered for active military service. For reasons of health, he was rejected. Though married and with two children at home, the patriotic Masefield had no intention of sitting out the Great War. Unlike Bertrand Russell, George Bernard Shaw, Wilfrid Blunt and other leading English writers and intellectuals who protested England's involvement in the war, Masefield very much supported it. And so in February 1915 he went to France as a British Red Cross orderly to serve French wounded at a hospital in the Haute Marne. To his wife Constance he soon wrote, as if in a state of shock: "You've no idea of it, you can't even guess the stink of it, from the bloody old reeking stretchers to the fragments hopping on crutches, and half heads, & a leg gone at the thigh, & young boys blinded and grey headed old men with their backs broken. . . . They are a fine lot, a noble lot, I love them all."

Over the next two years Masefield's war efforts became increasingly vigorous and wide-ranging. He tried (and failed) to create a mobile hospital closer to the front so that more of the wounded could be saved; he toured America for six months giving spirited propaganda speeches to drum up support for the Allies; he inspected medical facilities, became familiar with the latest techniques in plastic surgery and facial reconstruc-

SOLID BRASS
THE WALL SWINGER

$19.99
Add $3 Shpg. ea.
Factory to you . . . we make the world's greatest values!
3-way light
An essential addition for any room in your home. This functional and versatile lamp extends two feet and comes complete with 11½" dia. textured white shade. Your choice of polished brass or mellow antique finish (please specify). *Satisfaction a promise.* Check, VISA, or Mastercard. Order #90.
Nothing else looks like hand polished solid brass!
with luxe cord cover
ROBELIER
1500 South 50th St.
Phila., Pa. 19143
Dept. ST 7-5

Quantity	Finish	Price Each	Total
#90		$19.99	
☐ Mastercard	PA res. 6% tax		
☐ Visa	shipping ea.	$3.00	
☐ Check		TOTAL	

Signature _____ Ex. date _____
Name _____
Address _____
City _____ State _____ Zip _____

日本刀 JAPANESE SWORDS
For Free Evaluation Sheet
TOLL FREE 800-435-5119
$200 $10,000 CASH PAID
Japanese Military Decorations & German WWII Relics (especially daggers) Also Wanted
David E. J. Pepin—Member NBTHK, Tokyo, Japan
Dept. SI, P.O. Box 354, Grant Park, IL 60940

The ADIRONDACK
• Classic Design • All Redwood
• Easy Assembly • Matching Love Seat, Footrest, Sidecart & Table
• Send for Free Catalog
Cypress Street Center
Dept. SN, 350 Cypress St.
Fort Bragg, CA 95437 • 707-964-4940
ONLY $88 PPD!

Cartan® presents
The Mauna Lani Bay Hotel
Cartan brings you the ultimate luxury vacation. The perfect blend of sophistication, world-class golf and tennis, fine dining and the cordial style that is distinctively Hawaiian awaits you at the Mauna Lani Bay Hotel. Just one of six sensational resort vacations that Cartan's put together for you. Write or call for your free brochure. 1-800-323-7888.
Name_____
Address_____
City_____State_____Zip_____
My travel agent is_____
Please send the following brochures:
☐ China ☐ Rose Bowl ☐ Alaska/Canada
☐ Europe ☐ Hawaii ☐ Eastern U.S.
☐ Mexico ☐ Africa ☐ South America
☐ Specialty Tours ☐ Virgin Islands
AA CARTAN® SM7
One Crossroads of Commerce, Rolling Meadows, IL 60008

Masefield—poet, storyteller, romantic—became a war correspondent as well.

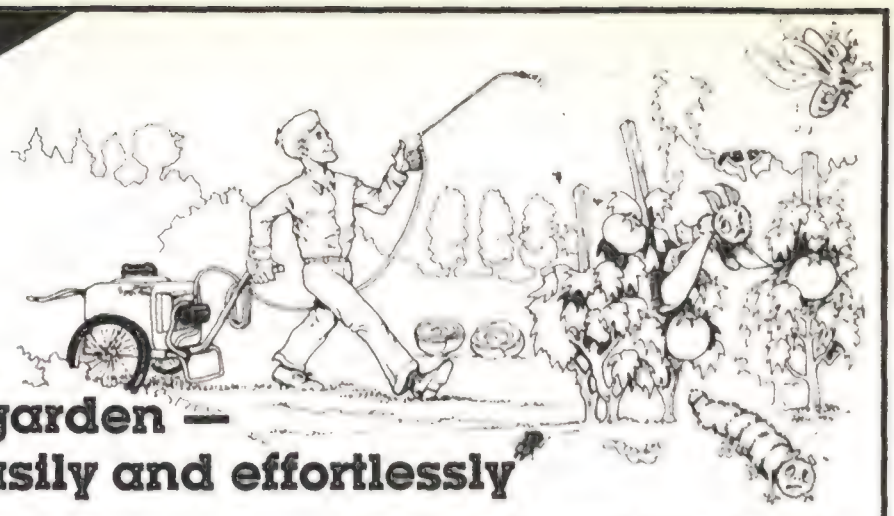
tion, made crutches and bedside tables for the wounded. And he wrote stirring accounts of campaigns in his war books *Gallipolli* (1916), *The Old Front Line* (1917) and *The Battle of the Somme* (1919), the latter commissioned by British military intelligence as an official history of that epic slaughter. All this activity was chronicled in the letters which Masefield wrote home to his wife, and they must have been received like shell bursts of color and image and feeling.

These 167 letters have now been published for the first time in *John Masefield's Letters From the Front 1915-1917*, edited by English novelist Peter Vansittart. The book provides a short but finely tuned biography of the poet, from the romantic, wayfaring years of his youth to his later period as England's much venerated poet laureate, as well as critical notes on his writings. The letters have been stitched together with background information that gives the book a surprisingly taut, dramatic quality. In some places it reads like a novel.

"We went into Verdun," Masefield writes, "that unconquerable city of the dead, & passed through silent, deserted streets of shut up, shuttered & ruined houses, & the Meuse with its sunken barge, and the heaps of its ruin. . . . It is pretty big, & was very densely populated for its size, & held always a good many troops, & now it is without inhabi-

NOW!

Enjoy a bug-free, weed-free yard and garden — quickly, easily and effortlessly



ANNOUNCING:

The First Portable Home Sprayer...designed for the suburban homeowner.

The new Mantis Spray Mate is a portable power sprayer for your garden, flowers, trees, and shrubs.

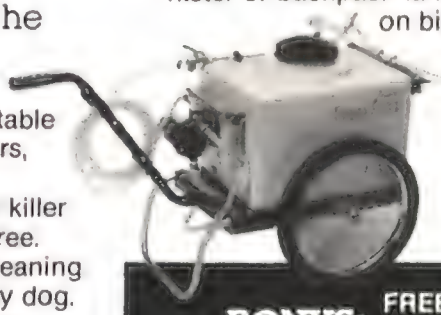
It's a speedy lawn feeder and weed killer to keep your grass green and weed-free.

It's an efficient power washer for cleaning everything from windows to the family dog.

It's a disinfectant dispenser for decks, pools and animal runs.

It's the perfect sprayer to use almost everywhere around your yard.

- **Easy To Use.** Instant push-button start... battery-electric power.
- **Safe.** Accurate...nozzle adjusts from fine mist to powerful jet...sprays to 25 ft.
- **Easy To Move.** No lugging heavy canister or backpack tanks...moves easily on big rubber wheels.



- **Fully Guaranteed.** Our famous no-quibble money-back guarantee.

3-WEEK HOME TRIAL
SPECIAL INTRODUCTORY PRICE

BONUS: FREE LIFETIME BATTERY AND PLUG-IN CHARGER

MANTIS SPRAY MATE
1458 County Line Rd., Dept. P122
Huntingdon Valley, PA 19006

☐ Rush details on SPRAY MATE, FREE 3-Week Trial, and FREE Bonus.

Name _____
Address _____
City _____
State _____ Zip _____

©MMC 1985

Which of these languages would you like to speak?

Mark the one you want to speak in 2 or 3 months' time

☐ Afrikaans	☐ Greek (Modern)	☐ Malay
☐ American English	☐ Hebrew (Modern)	☐ Norwegian
☐ Arabic (Modern)	☐ Hindi	☐ Polish
☐ Chinese (Mandarin)	☐ Icelandic	☐ Portuguese
☐ Danish	☐ Indonesian	☐ Russian
☐ Dutch	☐ Irish	☐ Spanish
☐ Finnish	☐ Italian	☐ Swedish
☐ French	☐ Japanese	☐ Thai
☐ German	☐ Korean	☐ Welsh

A Linguaphone Course makes you feel at home in almost any country. You'll never miss the meaning of conversations or be at a loss for words.

- It must work—over 4 million Linguaphone students in 88 countries speak a second language FLUENTLY
- Proven learning success. You LISTEN to real conversations on cassettes. UNDERSTAND what you hear by following illustrated textbooks. HOLD CONVERSATIONS with the speakers.
- **You start speaking the very first lesson.**
- You learn at your own convenience.
- You develop an authentic accent.
- A tax deductible asset for your business.
- **SAVE MONEY! Comprehensive course—basic and** intermediate instruction. ALL IN ONE COURSE.
- Course includes 30 lessons on cassettes...three textbooks...elegant carrying case.
- Order your Linguaphone course Today. Talk the language...feel at home in far away places.
- **MONEY-BACK GUARANTEE:** The Linguaphone Course is unconditionally guaranteed. Try it for 2 months, if you're not satisfied, return it for a full refund. There's no risk and no obligation, so order today!

Linguaphone The Language Masters

Linguaphone
313 Nolana Ave., Dept 438
McAllen, Texas 78504

DO IT NOW-SAVE TIME
CALL TOLL FREE: **800 - 531-7505**
IN TEXAS: (512) 687-6761

Yes, I accept your risk-free offer to speak a new language. Please send me the course(s) I have checked at only $148.00 per course postpaid guaranteed.

☐ **Check enclosed.** **Charge my** ☐ **Visa** ☐ **MasterCard** ☐ **American Exp.**

Acct. # _____ **Expires** _____

Name (please print) _____

Street _____

City _____ **State** _____ **Zip** _____

Signature _____ MONEY BACK GUARANTEE

tants except soldiers, & to see the signs of life, without life itself, is a grim thing. What impressed me most were the stopped clocks, pointing to all hours of the day & night, as the shell took them or as they ran down. Many of the windows were left open, & one could see the curtains blowing about, & sometimes a sewing-machine with a bit of work on it, or an open book on a table, or a little of clothes or toys. The silence of the streets was painful, & every now & then one came on the notice.

Attention. Vu à l'ennemi.

which was hard to bear, for one could see no enemy oneself."

These haunting and impassioned letters provide the reader with a portrait of John Masefield that is both startling and compelling. It is hard envisioning the great poet as an intrepid war correspondent such as Richard Harding Davis, and yet he seems to have been one. As Vansittart suggests, "Those who associate Masefield exclusively with the Georgian lyric might examine his war-writings."

Ronald Varney
New York writer and critic

With Fondest Regards
Françoise Sagan
Dutton, $14.95

Françoise Sagan, hard drinker, enthusiastic gambler, enfant terrible, is 50, and she has written a new book about Parisian high life. This time, she herself is a protagonist, but readers expecting an autobiography will be disappointed. Instead, this slim volume is a series of reflections about celebrities she has known and admired, and a few obsessions—speeding, gambling and reading—that have shaped her life.

Since she was 19, when her novel *Bonjour Tristesse* made her a star, Françoise Sagan has lived in a glittery public world. It is this world that she celebrates here, and only once, in the brief pages devoted to her four favorite books (by Gide, Camus, Rimbaud, Proust) do we get any sense of Sagan in repose; of Sagan alone, unaccompanied by such luminaries as Juliette Greco, Darryl Zanuck, Jean-Louis Trintignant or Roger Vadim; of Sagan the writer.

In reading, she lives in a different, a quieter, more reflective world, where her intense response to authors and their creations makes her aware of her own individuality. "It was only when I let others live in my place," she writes, "when I read about them, that my own existence became at last wholly accessible to me."

In the rest of the book she is effaced by some large and powerful presences: the husky-voiced, dissipated Billie Holiday, urging Sagan's husband to beat her; the volatile Orson Welles, a "young black raging bull," brilliant and ambitious, but rejected by Hollywood; the aging Sartre, blind, jabbing messily at his food and protesting his enduring optimism; the "highly strung" Carson McCullers along with Tennessee Williams, drinking straight gin from early morning through late night in Key West.

Sagan's portraits are sharp, swift, affecting—but sometimes they embellish, rather than intensify, the image we already may have of some of her notable friends. Of her two weeks in Key West with Williams and McCullers, Sagan writes: "We did not discuss anything very profound. We did not talk about our private lives, we were quite reserved with one another, but I knew then that one day I would look back regretfully on those moments of happiness." Her regret is not for lost intimacy with these two complex and difficult writers, but for an end to their "torrid and riotous" outings, their mutual escape from a hostile and threatening world.

Sagan is at her best when she moves fast: on a desperate search through New York and the suburbs of Connecticut for Billie Holiday; through a telescoped history of her beloved Saint-Tropez; speeding at 120 mph on narrow French roads. "Whoever has not thrilled to speed has not thrilled to life," she announces, "or perhaps has never loved anyone."

Sagan has thrilled to life, has loved, lost and loved again—but we never meet the objects of her affections. They remain in the shadows, elusive members of her entourage. We merely glimpse her "first husband," rather disconcerted at meeting Billie Holiday. We hear nothing of her sister and a friend who trekked down to Key West with her. We never see her unnamed traveling companions. Sagan keeps her private life private.

And yet the book is charming, and Sagan's gallery of portraits includes a luminous sketch of Rudolf Nureyev, a man she admits she does not fully understand, but still has been able, as she puts it, to "capture . . . symbolically," half-naked in his leotard, "alone and handsome, raised on tiptoe, gazing into a tarnished mirror, with mistrustful and wondering eyes, on the reflection of his art." The description might well be applied to Sagan herself.

Her choice of title here sounds like a farewell. But this book calls for a sequel, for many sequels, so that a composite of these memories might serve sometime as the autobiography that Sagan, unfortunately, seems reticent to write.

Linda Simon
Author and critic

Reprise: The Extraordinary Revival of Early Music
Joel Cohen and Herb Snitzer
Little, Brown, $25

Early music is more than a repertoire of medieval, Renaissance and baroque compositions. Bach on a synthesizer and Vivaldi concertos piped into an elevator simply don't qualify. More surprising, neither do most performances of music written before the 19th century. Modern orchestras may play Vivaldi beautifully, but they aren't playing the kind of music that *Reprise* is all about.

What distinguishes early music, say Cohen and Snitzer, is its performance by musicians using accurate reproductions of period instruments and authentic historical techniques of playing. And modern practitioners of early music, "the avant-garde of the distant past," are not merely off on some sterile quest for authenticity. They play the way they do because it feels right to them, and because they believe that the historical styles bring out the best in their repertoire.

Reprise is not, however, a study of music theory. The authors don't ignore technical matters, but because Cohen (music director of a respected early-music group, Boston Camerata) and Snitzer (photojournalist and professor, who produced the book's 115 black-and-white photographs) are far more interested in the performers themselves, they have chosen to describe the early-music revival through a series of capsule profiles of the people who play in historical style.

Their approach makes for entertaining reading. Gossipy, personal and full of deeply felt convictions, the book gives a nice overview of a musical revolution as

Avis features GM Cars. Chevrolet Chevette.

The American Express® Card and Avis' low SuperValue Weekly Rates make it easy to get away from it all.

When the desire to get away from it all overcomes you, Avis' low SuperValue Rates and the American Express® Card can help you get to that perfect hideaway.

Avis' low SuperValue Rates are available by the week on any size car, from a fuel-efficient subcompact to a roomy full-sized sedan. Even station wagons and vans. All with no charge for mileage.

ARIZONA $99

CALIFORNIA $119

DENVER $109

FLORIDA $69

Wherever you're escaping to, be sure to use the American Express Card. It's welcome at Avis rental locations and just about anywhere you'd want to go to get away.

Call Avis at 1-800-331-1212 in advance for details and reservations. Or see your travel consultant. And start making plans to lose yourself.

The American Express® Card.
Don't leave home without it.®

AVIS®
WE TRY HARDER. FASTER.™

Rates apply to Chevrolet Chevette or similar car and are for 5, 6 and 7 day rentals. Cars subject to availability. Rates are nondiscountable and subject to change without notice. Southern California requires 24-hour advance reservation. Available at corporate and participating licensee locations. If car is kept fewer than five days, a higher daily rate will apply for each rental day. Car must be returned to same city or higher rates and drop-off fees may apply. Refueling service charges, taxes, optional CDW, PAI and PEP not included. Standard Avis driver, age and credit requirements apply. ©1985 Avis Rent A Car Systems, Inc. Avis®

seen through the eyes of a true believer. The writing is often florid or flippant, and the authors' pantheon of heroes by no means complete (a fact that they acknowledge, and for which they more or less apologize), but most of the biggest names in the field are mentioned and most of the major issues are at least touched upon.

This breezy gambol will leave many readers wanting more information. The problem is that *Reprise* never explicitly describes how musicianship has changed since the 18th century. We need to be told, for example, how the instruments differed from today's. Baroque flutes were wooden, baroque violins had shorter necks and lower bridges, and baroque horns didn't have any valves. Many medieval and Renaissance instruments like racketts, shawms and krummhorns don't even have modern counterparts.

Performance practices have also changed. During the baroque era the clear, sharp articulation of separate notes was emphasized and vibrato used as an ornament. In modern playing, by contrast, vibrato is used almost continuously

Author-musician Joel Cohen, with lute, is authority on early-music movement.

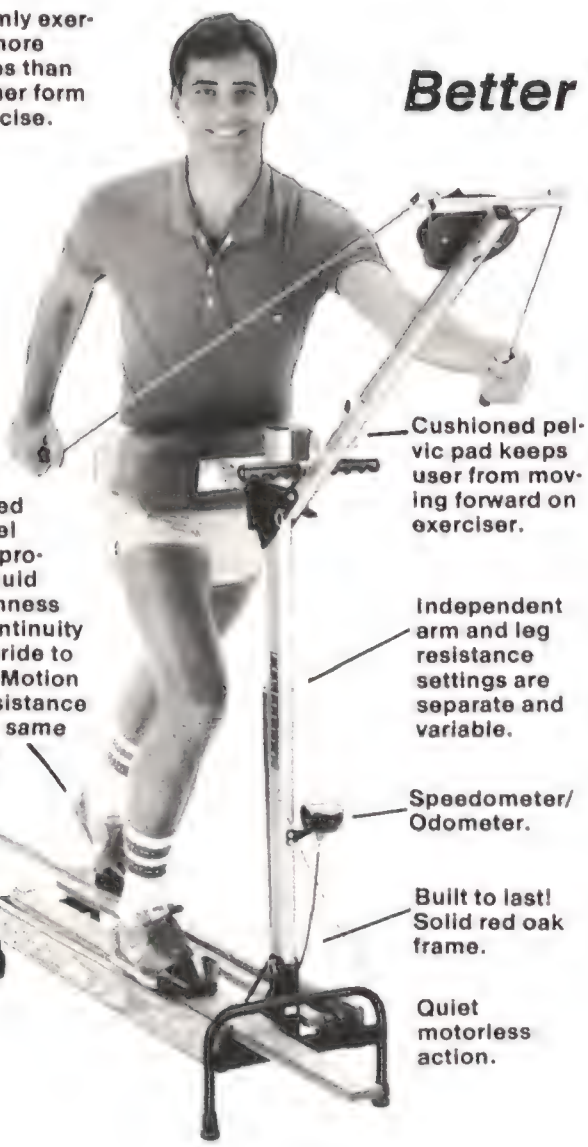
and notes strung together in a smooth, seamless way. In medieval and Renaissance music, composers didn't even specify what instruments were to play particular lines, much less bother with writing down how their melodies were to be ornamented. Instead, they left matters of orchestration and elaboration to the skill and sensitivity of the performers.

Such details are scattered throughout the book, but they are never drawn together into a coherent whole. An equally serious flaw is that Cohen and Snitzer fail to explore important aspects of the subject they have staked out. They never discuss the significance of a growing coterie of skilled, scholarly instrument makers, for example, and virtually ignore the role that institutions like Switzerland's Schola Cantorum and a number of American conservatories and universities have played in the contemporary revitalization of early music.

Reprise ends up reading like a gushy history of some extinct rock group. It will attract committed fans and fanciers (many of whom will buy it for the pictures alone), but probably will make few new converts. This is unfortunate, because the early-music revival has a lot to offer. Like Cohen and Snitzer's baroque violinist, "with her curved bow, her gut strings, her peculiar thin outlandish too soft not rich enough not loud enough not wobbly enough not exciting enough above all not familiar enough sound," the resurrected techniques are making some staid old relics sound new again. And in the end, this is the real excitement behind the revival of early music.

John R. Alden
Writer and book reviewer

Uniformly exercises more muscles than any other form of exercise.


Cushioned pelvic pad keeps user from moving forward on exerciser.
Patented flywheel action provides fluid smoothness and continuity from stride to stride. Motion and resistance are the same as real skiing.
Independent arm and leg resistance settings are separate and variable.
Speedometer/ Odometer.
Built to last! Solid red oak frame.
Quiet motorless action.

Cross Country Skiing Exerciser
Better Than Exercise Bikes & Rowing Machines

The enjoyable sport of cross country skiing is cited by leading physiologists as the most perfect form of aerobic exercise. Its rhythmic total body motion uniformly exercises more muscles than other forms of exercise and its smoothness causes no joint pain or damage. NordicTrack lets you get the same top fitness building benefits year around in the convenience of your home. NordicTrack eliminates barriers of time, weather, chance of injury, etc. Very effective for weight control.

More Effective and Safer Than Rowing Machines

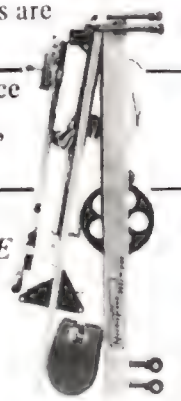
When rowing, the leg resistance is only as strong as the pull of the arms. Since your legs are 3 times as strong as your arms either the arms are over-worked or the legs loaf. In contrast, NordicTrack's resistance is proportioned according to the individual muscle strength – thus NordicTrack provides a far more effective workout because no major muscles are over stressed or under worked.

NordicTrack is much safer because no high back strain loads are imposed.

Much Better Than Exercise Bikes

More complete. Adds important upper body exercise and provides more uniform leg muscle usage. Higher pulse rates, necessary for building fitness, seem easier because more muscles share the exercise. Safer. Deeply bent knee motion of exercise bikes can cause knee problems. NordicTrack's erect position causes no high joint stress.

Exclusive Patented Flywheel Action Provides unmatched smoothness and continuity from stride to stride. Motion and resistances are same as in real skiing.



- Fits in your home or office
- Folds and stands on end to require only 15" x 17" storage area

Two year warranty, 30 day trial period. Call TOLL FREE or Write for Free Brochure.

1-800-328-5888
Minnesota 612-448-6987

NordicTrack

The Jarless Total Body Exerciser.

Additional reading

Boy Scouts (p. 32)

Baden-Powell's Scouting For Boys and Baden-Powell's Aids to Scoutmastership, Boy Scouts of America, 1982

What to do and How to do it: The American Boys Handy Book by D. C. Beard, Charles E. Tuttle (Rutland, Vermont), 1982

The Boy Scouts of America: A Model and a Mirror of American Society by Carolyn Ditte Wagner, University Microfilms International (Ann Arbor, Michigan), 1978

Tree rings (p. 46)

"Tales the Tree Rings Tell," National Science Foundation *Mosaic*, September/October 1977

"Tree-ring Analysis (Dendroclimatology)" by Harold C. Fritts, in *The Encyclopedia of Climatology*, edited by John E. Oliver (in *The Encyclopedia of Earth Sciences*, edited by Rhodes W. Fairbridge) to be published by Van Nostrand Reinhold, May 1986

"Tree-ring Dating in Archaeology" by Jeffrey S. Dean, *Anthropological Papers*, No. 99, edited by Jesse D. Jennings, University of Utah Press, 1978

John Frederick Kensett (p. 58)

John Frederick Kensett: An American Master by John Paul Driscoll and John K. Howat (exhibition catalog), Worcester Art Museum in association with W. W. Norton, 1985

The Hudson River and Its Painters by John K. Howat, Viking, 1972

"American Landscape: Changing Concepts of the Sublime" by Barbara Novak, *American Art Journal*, Spring 1972

STEAMBOATIN'

At 8 m.p.h., discover 150 years of America in 7 days

At 8 m.p.h., America is on parade every day aboard the Delta Queen® and Mississippi Queen.® New Orleans with its creole cooking and clarinets wailing in the night. Memphis, birthplace of the Blues! The haunting Civil War battlefields of Vicksburg and Natchez. St. Louis to St. Paul...And, along the way, Hannibal, Missouri, boyhood home of Mark Twain...

On your journey, aboard one of America's two authentic steamboats, you'll enjoy some real Steamboatin' hospitality. Feast on five glorious meals a day. There's nightly Dixieland Jazz and red hot Mamas singing the blues; and a friendly, young All-American crew who only want to please you...

...Steamboatin' through America! For free color brochure or reservations information, see your favorite travel agent or call: ***1-800-228-2211.***

STEAMBOATIN'

It's America's National Treasure.®

The Delta Queen Steamboat Company · #30 Robin Street Wharf · New Orleans, Louisiana 70130

MIRROR PLACEMATS

Light shimmers on these elegant mirror placemats, etched with graceful floral designs. Add their romantic glow to your table. Felt pads prevent scratching, sliding. Easy care. Made in USA.

Etched Mirror Placemats. 12″ × 18″. Set of 4, $39.99. Please add $3.00 shipping & handling.

Mirror Table Runner. Beveled edges. 3 pieces together measure 10½″ × 36″. For smaller settings, use center sections alone or two end pieces together. $19.99. Please add $2.00 shipping & handling.

Save $10.00. 4 placemats & table runner—just $49.98. Please add $3.50 shipping & handling.

Check, money order, AMEX, MC, VISA (send number, exp. date, signature). NY residents, please add tax.

Through the Looking Glass
Dept. SM10 • 230 Fifth Avenue, Room 1212 • New York, NY 10001
© 1985, Through the Looking Glass

Plains Indian art, artifacts & jewelry.

Colorful, educational catalog shows nearly 100 beautiful examples of mounted buffalo skulls, bow and arrow sets, knives, painted buffalo and elk robes, shields, war axes, Ghost Dance shirt, coyote fang necklace and more unique gifts, stunning decorations and collector's items from exclusive source. All are hand made with authentic materials. Catalog tells the fascinating story of each item's place in Cheyenne, Sioux, and Blackfoot heritage. For your copy, send $2 today.

PRAIRIE EDGE

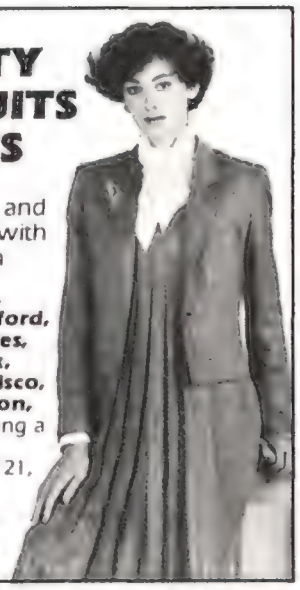
PHONE SALES/CATALOG REQUEST OFFICE
PO Box 8303, Dept. SM2 Rapid City, S.D. 57709-8303 (605) 341-4525
VISIT OUR STORES IN SANTA FE, N.M., SCOTTSDALE, ARIZ. AND DEADWOOD, S.D.
DEALER INQUIRIES INVITED

Special Care for Special People

Progressive education, home environment for the mentally handicapped child and adult. Opportunity for educational progress at any age. Year round program. Multiple recreational & social activities — a full life-style among friends on a 500-acre blue-grass estate. Est. 1893. Phone 502-875-4664 or write

THE STEWART HOME SCHOOL
Box 96, Frankfort, Ky. 40601
John P. Stewart, M.D., Resident Physician

MATERNITY BUSINESS SUITS & DRESSES



Catalog with swatches and fit guide $3, refundable with order. Visit our stores in

Atlanta, Charlotte, N.C., Chicago, Denver, Haverford, PA, Houston, Los Angeles, New Orleans, New York, Philadelphia, San Francisco, Stamford, CT, Washington, D.C. or inquire about opening a store in your area. Tel. 215-625-0151. P.O. Box 40121, Dept. S22, Phila., PA 19106

MothersWork™

GALAPAGOS

You, 9 other adventurers and our licensed naturalist will sail by schooner to explore more islands than any other Galapagos expedition. 16 Trip dates. M. Picchu Option.
FREE BROCHURE
INCA FLOATS 415-435-4622
1606 Sd Juanita, Tiburon, CA 94920

The Great Schooners

The publishers of "The Great Schooners" series of limited edition prints by Thomas Hoyne, now make available note cards depicting these famous Gloucester fishing vessels.

Each gift box contains 10 cards and envelopes. Send $10.00 plus $1.25 shipping for note cards or $5.00 for color catalog of Hoyne prints to: JANUS PRINTS, Dept. S, P.O. Box 3303, Hilton Head Is., SC 29928 or call (803) 681-4242.

Experience the wonders of Europe with Cartan®.

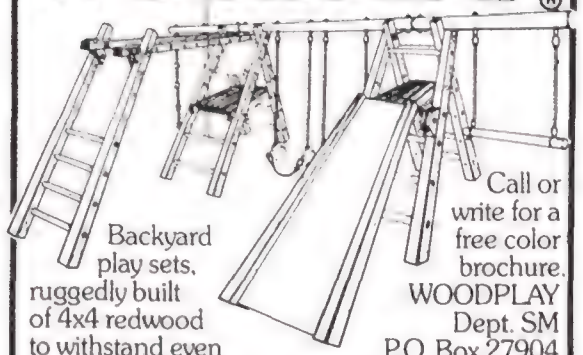
Cartan brings you the ultimate luxury vacations. European tours that offer extraordinary travel experiences—like cruising the Mediterranean on the incomparable Sea Goddess, or luxuriating in the elegance of the Venice Simplon-Orient-Express. The finest hotels. The best dining. Write or call for your free brochure. 1-800-323-7888.

Name_____
Address_____
City_____ State_____ Zip_____
My travel agent is_____
Please send the following brochures:

☐ China ☐ Rose Bowl ☐ Alaska/Canada
☐ Europe ☐ Hawaii ☐ Eastern U.S.
☐ Mexico ☐ Africa ☐ South America
☐ Specialty Tours ☐ Virgin Islands

CARTAN® SM7
One Crossroads of Commerce, Rolling Meadows, IL 60008

WOODPLAY®



Backyard play sets, ruggedly built of 4x4 redwood to withstand even the toughest climate for years.

Call or write for a free color brochure.
WOODPLAY
Dept. SM
P.O. Box 27904
Raleigh, NC 27611-7904
(919) 832-2970

Aphids (p. 68)

Aphid Ecology by A. F. G. Dixon, Blackie (Glasgow and London), 1985

Invertebrate Types: Aphids by Roger Blackman, Ginn (London and Aylesbury), 1974

Voice lab (p. 78)

"The Acoustics of the Singing Voice" by Johan Sundberg, *Scientific American*, March 1977

"Research Report" by the Recording and Research Center of the Denver Center for the Performing Arts, *DCPA-RR*, No. 1, 1985

"The Clinical Voice Laboratory: Clinical Application of Voice Research" by Wilbur J. Gould, *Annals of Otology, Rhinology & Laryngology*, July/August 1984

Independent truckers (p. 91)

Open Road: Truckin' on the Biting Edge by Axel Madsen, Harcourt Brace Jovanovich, 1982

Management of Owner-Operator Fleets by David H. Maister, Lexington Books (Lexington, Massachusetts), 1980

Calke Abbey (p. 100)

Calke Abbey, Derbyshire: A Hidden House Revealed by Howard Colvin, Sheridan House (Dobbs Ferry, New York), 1985

Our Vanishing Heritage by Marcus Binney, Arlington Books (London), 1984

The National Trust Guide to England, Wales, & Northern Ireland, edited by Robin Fedden and Rosemary Joekes, Norton, 1978

Robert Langridge (p. 114)

"Real-Time Color Graphics in Studies of Molecular Interactions" by Robert Langridge et al., *Science*, February 1981

"Designing Molecules by Computer" by Jonathan B. Tucker, *High Technology*, January 1984

The Eighth Day of Creation by Horace F. Judson, Simon and Schuster, 1979

Mers-el-Kebir (p. 122)

From the Dardanelles to Oran by Arthur J. Marder, Oxford University Press, 1974

The Deadly Stroke by Warren Tute, Collins (London), 1973

The French Navy in World War II by Paul Auphan and Jacques Mordal, Naval Institute (Annapolis), 1959

Smithsonian highlights

Enhance your evenings this summer with the sounds of the Zoo's 1985 Sunset Serenades. Each Thursday evening from July 11 to August 29, from 6:30 to 8 P.M., local musicians will entertain you near the Panda House as zebras, gazelles and kangaroos look on. Bring a picnic dinner and relax. Admission is free; for more information, call 673-4717.

Planning a Smithsonian visit?

Get a head start—send a postcard request or call for a free previsit planning packet: Visitor Information and Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560; (202) 357-2700 or TDD for hearing impaired (202) 357-1729.

Special July exhibits and events

National Museum of American History
Discover Graphics (through July 30) Etchings of Washington, D.C., sites by local art students.
Celestial Images: Astronomical Charts, 1500-1900 (through August 23).

National Portrait Gallery
U.S. Grant: The Man and the Image (July 23-November 11).

National Museum of Natural History
Aditi: A Celebration of Life (through July 28).
Gift of the Earth (through November 30) Zuni pottery of 19th and 20th centuries.

Renwick Gallery
The Woven and Graphic Art of Anni Albers (through January 5, 1986).

National Air and Space Museum
Ten Years After Apollo-Soyuz (July 17) All-day symposium on international competition and cooperation in space.
Starsteps (July 6; 10 A.M.) Monthly sky lecture on the sun and stars.

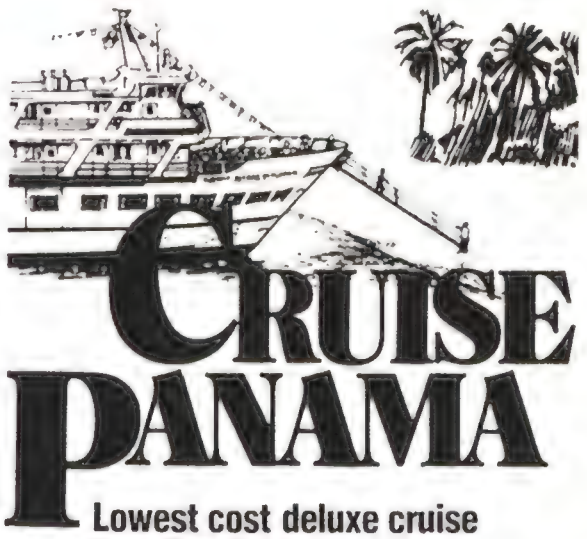
"This GMC is me."
Take out a new GMC Safari and you might discover that this GMC is you, too.
Safari's the new-size van that's just the right size van. It's elegant enough to take anywhere. And it's spacious enough to hold almost anything, including up to eight passengers with optional seating.
Buckle up and slip into something comfortable at your nearest GMC dealer: the new GMC Safari. It's designed to make you agree, "This GMC is me!"
GMC
A truck you can live with.
GM

RUSSIAN
LACQUER BOXES
PLEASE SEND FOR OUR
FREE COLOR BROCHURE
LIGHT OPERA GALLERY
GHIRARDELLI SQUARE #1025
SAN FRANCISCO, CA 94109
415-775-7665

DISCONTINUED
CHINA and CRYSTAL
WORLD'S LARGEST INVENTORY
We carry all major brands of china, earthenware, crystal. Complete your sets. Inquire about your patterns now!
BUY or SELL (919) 275-7224
1510-SM HOLBROOK, GREENSBORO, N. C. 27403-2785
VISA M'Card Amer. Ex.
REPLACEMENTS, LTD.

FAMILY CREST RINGS

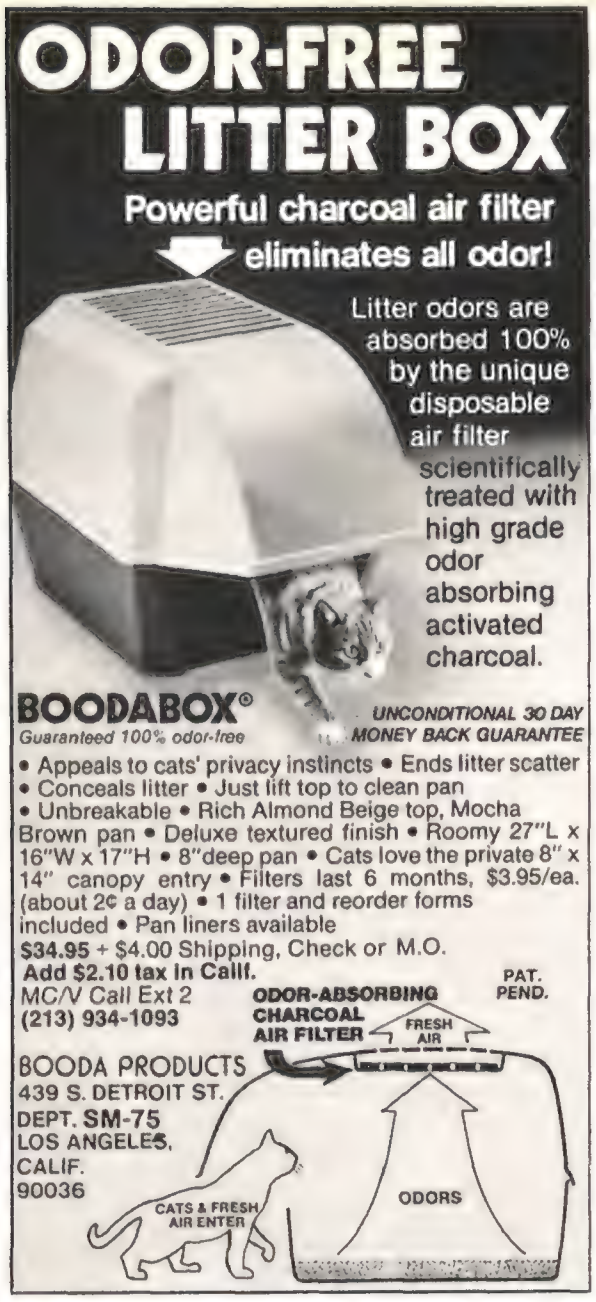
14K Gold..... $599.00
Sterling Silver... $250.00
WE WORK IN THREE BASIC WAYS—If you have a crest send us a copy of it and that is what we engrave, or you may use the one shown in our Armorial Booklet, or you may design your own. SEND FOR OUR FREE COLOR CATALOGUE. Or, if in addition to the free catalogue you want our 96 page Armorial Booklet that contains 4,000 drawings of coats of arms for the names most frequently used in this country plus instructions on how to design your own coat of arms. SEND US $2.00.
HERALDICA IMPORTS, INC. Dept. SM
21 WEST 46th ST. NEW YORK, N.Y. 10036



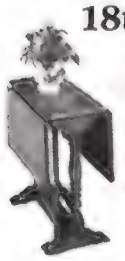
CRUISE PANAMA

Lowest cost deluxe cruise thru Canal. Enjoy a tropical cruise; sun and relax on beautiful, exotic beaches, and swim and snorkel in warm, aquamarine waters. Discover Colonial Panama, transit the Canal, see San Blas Islands, historic Spanish Main Gold Ports, plus Pearl Islands and Indian Villages in the Darien Jungle. For reservations or free brochure, see any travel agent, mail coupon or call toll free **1-800-426-0600** (in Seattle 624-8551).

EXPLORATION®
HOLIDAYS AND CRUISES
Please send your new Panama Cruise brochure.
1500 Metropolitan Park Bldg, Dept.CTM, Seattle, WA 98101
Name _____
Address _____
City _____ State ____ ZIP ____
Phone _____

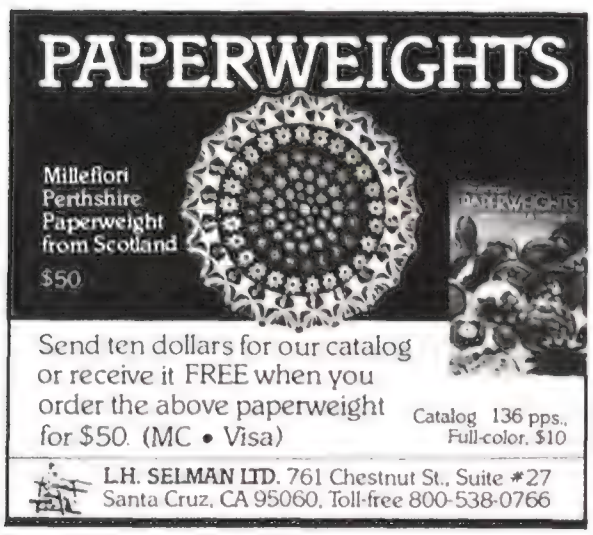

ODOR-FREE
LITTER BOX
Powerful charcoal air filter
eliminates all odor!
Litter odors are absorbed 100% by the unique disposable air filter scientifically treated with high grade odor absorbing activated charcoal.
BOODABOX®
Guaranteed 100% odor-free
UNCONDITIONAL 30 DAY MONEY BACK GUARANTEE
• Appeals to cats' privacy instincts • Ends litter scatter • Conceals litter • Just lift top to clean pan • Unbreakable • Rich Almond Beige top, Mocha Brown pan • Deluxe textured finish • Roomy 27"L x 16"W x 17"H • 8"deep pan • Cats love the private 8" x 14" canopy entry • Filters last 6 months, $3.95/ea. (about 2¢ a day) • 1 filter and reorder forms included • Pan liners available
$34.95 + $4.00 Shipping, Check or M.O.
Add $2.10 tax in Calif.
MC/V Call Ext 2
(213) 934-1093
ODOR-ABSORBING CHARCOAL AIR FILTER
FRESH AIR
PAT. PEND.
BOODA PRODUCTS
439 S. DETROIT ST.
DEPT. SM-75
LOS ANGELES, CALIF.
90036
CATS & FRESH AIR ENTER
ODORS

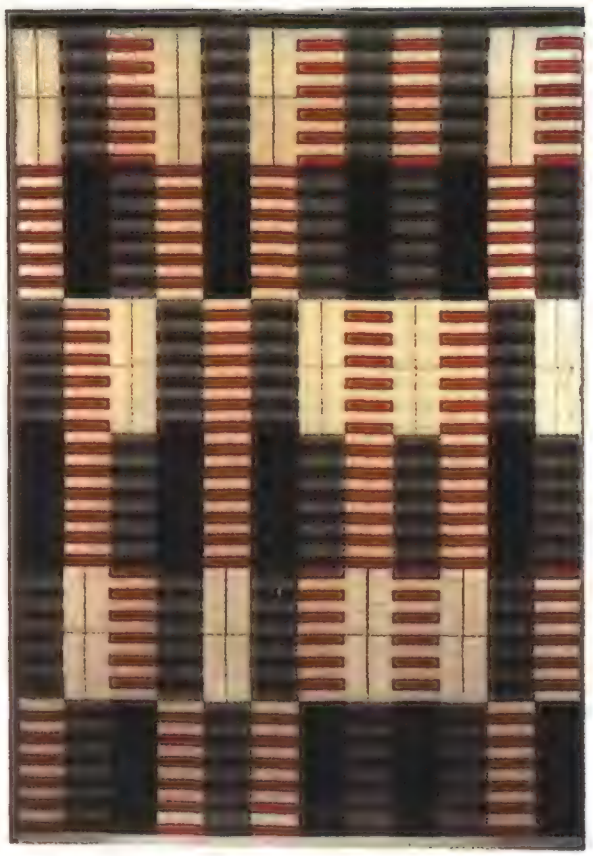
MAAT — Ancient Egyptian Goddess of Truth & Justice. Colorful 19th Dynasty tomb painting on genuine handmade papyrus 7" x 9" . . . $31 ppd. Lucite frame add $19. Check/Charge. BROCHURE — showing gods, symbols, "Book of the Dead" panels — 25¢.
ANCIENT WORLD ARTS, LTD.
50 W. 76 St. • NY 10023 • Dept. S785
Gallery open by appointment only.
PAPYRUS



18th-Century Furniture Kits

The original, and the largest manufacturer of authentic museum quality reproduction furniture kits in solid cherry, ash and mahogany. **1-800-BARTLEY**
Free Sale Catalog In Illinois 634-9510
The Bartley Collection, Ltd.
747 Oakwood Ave., Dept. S723
Lake Forest, IL 60045


PAPERWEIGHTS
Millefiori Perthshire Paperweight from Scotland
$50
Send ten dollars for our catalog or receive it FREE when you order the above paperweight for $50. (MC • Visa)
Catalog 136 pps., Full-color, $10
L.H. SELMAN LTD. 761 Chestnut St., Suite #27
Santa Cruz, CA 95060. Toll-free 800-538-0766



At Renwick: Anni Albers' 1927 woven wall hanging, *Black, White and Red.*

Cooper-Hewitt Museum (New York)
Timeless Sources: Rare Books in the Cooper-Hewitt Museum (through October 6). See *Highlights continued.*
Wine: Celebration and Ceremony (through October 13).

Exhibition catalogs

Catalogs available at this time include:
Creation and Renewal: Views of Cotopaxi by Frederic Edwin Church (paper, $14.95)
Joseph Wright, American Artist (1756-1793) (paper, $8.95)
Material Evidence: New Color Techniques in Handmade Furniture (paper, $5)
Lithographs of James McNeill Whistler (paper, $8)
Celestial Images (paper, $9.75)
Representation Abroad (paper, $15)
Anni Albers (paper, $17.50)
Aditi, Living Arts of India (paper, $14.95; cloth, $27.50)
Coffee and Tea Piazza (paper, $15)

To order, send check or money order to Museum Shops, Box 44083, Washington, D.C. 20026-0083. Include 15 percent of total purchase to cover postage and handling (minimum, $1.75).

Smithsonian on the air

Radio Smithsonian: features on this weekly half-hour series include a look at two new exhibitions at NMNH on evolution of mammals, Maine coast biosystem. *Smithsonian Galaxy*: short radio features. *Here at the Smithsonian . . .*: two-minute features look at kites and the Smithsonian's model shop.
Smithsonian World: summer rebroadcast schedule begins July 1, 9 P.M., with "Time and Light" and will continue on subsequent Monday evenings.

In Open Air: A Portrait of the American Impressionists: this award-winning half-hour film from the Smithsonian will be broadcast on public television July 12.

To find out what stations in your area carry these radio and TV programs, write: Office of Telecommunications, NMNH Room C222B, Washington, D.C. 20560.

Resident Associate events

To become a Resident Associate, or to find out about the many other activities presented monthly, or for fee and ticket information, call 357-3030. Here are some July events:
Antiphony: The Annapolis Brass Quintet and the Budapest Brass Quintet (July 1; 8 P.M.) Joint concert.
Adventures Beneath a Rainbowed Sea (July 9; 8 P.M.) Photographer Christopher Newbert discusses his work.
Country Girls—A Reprise (July 16; 8 P.M.) Film, starring Sam Neill, about two 14-year-old girls maturing during 1950s.
Streetsongs (July 20, 8 P.M.; July 21, 4:30 P.M.) Geraldine Fitzgerald performs.

Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibitions to hundreds of cities outside Washington. To sponsor a show in your community, write: SITES, Smithsonian Institution, Washington, D.C. Here are some July exhibits:
Los Angeles (July 20-November 3) *Jamaican Art: 1922-1982*, Museum of Afro-American History & Culture.
Clearwater, Florida (July 20-August 18) *The Magic of Neon*, Ruth Eckerd Hall.
Logan, Kansas (July 6-August 18) *Artist and the Space Shuttle*, Dane G. Hansen Memorial Museum.
New York City (July 15-October 15) *The Art of Cameroon*, American Museum of Natural History.

Visiting members' benefits

Begin your visit at the Associates' Reception Desk in the castle. You will receive printed materials, details on members' benefits and an orientation program.

Highlights continued

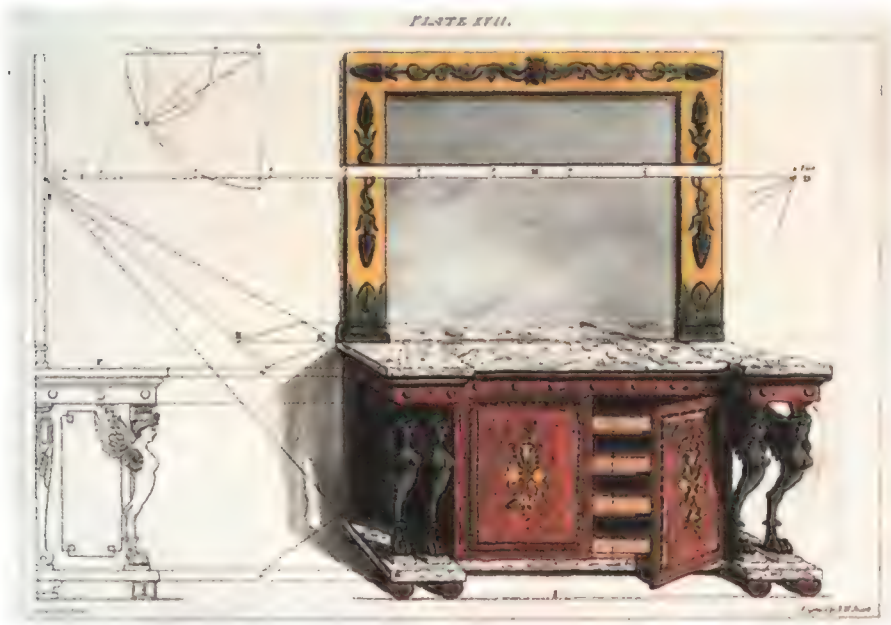
Treasure trove of books as tools

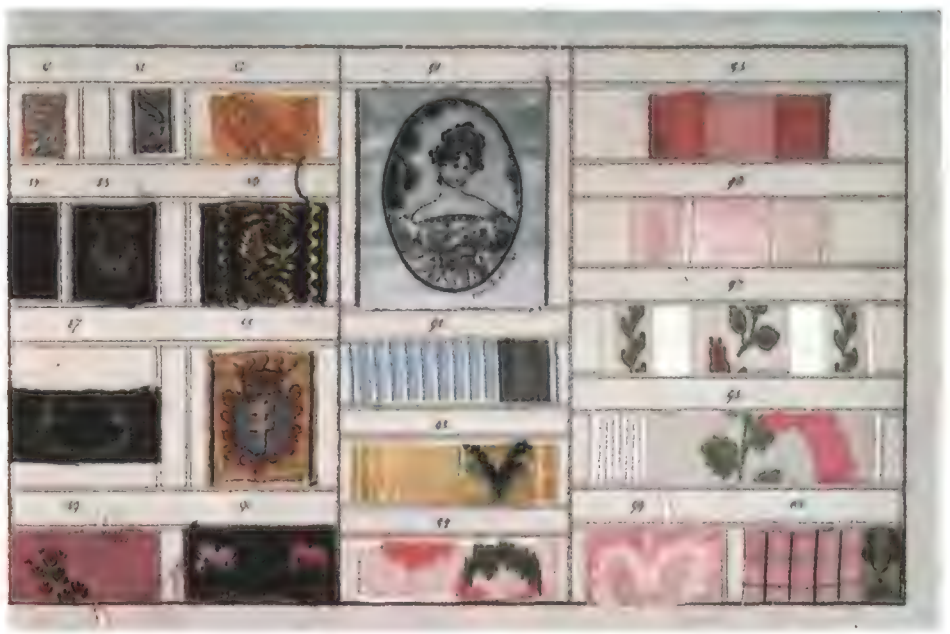
Yesterday's 'how-to' manuals were exquisite works in their own right—some even held the finished piece

When museum librarian Katharine Martinez put together the 60 volumes that comprise "Timeless Sources: Rare Books in the Cooper-Hewitt Museum," her task was formidable. With more than 3,000 candidates, she had to narrow her field. "So," says Martinez, "I looked for books that had been used as tools—to teach, to advertise, to record patterns."

Many of the craft manuals she found were rendered with extreme care. Among the most elegant are Richard Brown's *Rudiments of Drawing Cabinet and Upholstery Furniture* (top, left) and the pocket-size *Chimney-Piece Maker's Daily Assistant* (bottom, left). Many of the teaching books include the genuine article, such as the Irish guide for sewing teachers, with glued-in miniature samples of each lesson (bottom, center); or a book on ostrich-feather dyeing, in which tiny feathers affixed next to each recipe illustrate the appropriate hue. Somehow, despite (or perhaps because of) the new trend toward instant electronic delivery on screen of your favorite book, these manuals with the feathers and the swatches and the little dresses you can touch have the most appeal of all.
Constance Bond

British professor's 1835 book showed designers correct way to draw furniture.





Fabric swatches in 1832 Viennese pattern book let weavers check their own work.

In picture from a chimneypiece maker's manual, 1766, client looks on.

Miniature of finished dress was glued into 1835 Irish sewing teacher's guide.

Early 20th-century New York catalog put cane furniture in inviting setting.

Join with other Smithsonian Associates

Travel and Study, at Home, Abroad . . . and

As a Smithsonian Associate, you can enjoy the benefit of culturally oriented experiences under the guidance of museum curators or visiting scholars. Your lively curiosity and broad interests have resulted in a comprehensive study program to meet many tastes and budgets.

Domestic Study Tours

Vermont Sampler July 12-20: A look at Yankee history, culture and crafts.

Oregon July 19-28: Fresh sea air, colorful wild flowers, mountain vistas and historic lodges highlight this outdoor adventure.

Colorado Rockies July 28-August 8: Hike the majestic Pikes Peak area while staying at a private lodge located on 6,000 acres of wilderness.

Salmon River Rafting August 5-13: Do something different this summer! Float on oar-powered rafts down the Middle Fork of the Salmon. Plunge through white water, hike through backcountry wilderness, camp under the brilliant stars.

Crow Canyon Archaeology August 11-18: Get hands-on experience as you join archaeologists near Mesa Verde, Colorado, to participate in a dig at an ancient Indian site.

Delta Queen September 6-14: STEAMBOAT A-COMIN! Board the legendary paddlewheeler for a nostalgic voyage on the mighty Mississippi to Hannibal, Missouri, for the grand celebration of Mark Twain's 150th birthday.

New England Seaports September 12-22: Relive the great seafaring era. Visit the ports of Boston, Nantucket, Newport.

Arches/Canyonlands September 21-28: Utah's magnificent red-rock country, land of deserts, canyons and rivers. Travel by trail, jeep and raft with guide.

Maine September 21-30: Hike amid gorgeous fall foliage on rocky coast, inland mountains with a naturalist.

Pueblo Indians and Spanish Villages of New Mexico September 28-October 7: Visit craftsmen, museums and private collections in Santa Fe, Taos and Albuquerque.

California Wine Country October 6-12: Learn to select, enjoy and evaluate California wines. Visit wineries in Napa, Sonoma and Mendocino with wine experts.

Cumberland Island November 9-15: Enjoy the beauty of what was the Carnegie family's Georgia island retreat. Camp on unspoiled beaches, hike in coastal forests.

Everglades in December: For the novice or expert, canoe and camp among the Ten Thousand Islands along the west coast of Florida.

Christmas at the Smithsonian: Celebrate this festive season by spending a weekend at the Smithsonian with behind-the-scenes tours and special dinners in museums.

Coming in February: A journey to out-island areas of Hawaii, a whale-watching adventure in Baja on the *Royal Polaris*.

Washington "Anytime" Weekend: Discover your capital city in the Smithsonian style. As a membership benefit enjoy private tours, luxurious accommodations and much, much more. A perfect weekend getaway. Must reserve ten days in advance.

Foreign Study Tours

People's Republic of China, 1985: Exclusive tours to a variety of destinations are led by a Sinologist and include intensive pretour briefing.

Cambridge/Smithsonian Aerospace Studies July 11-28: Study history of air power or astronomy. Begin at National Air and Space Museum, then fly to famous English university.

Land of the Vikings July 21-August 4: Three days in Edinburgh, then board the *Illiria* for Norway's majestic fjords and Copenhagen.

Iberia and Provence August 12-26: Visit Santiago de Compostela and Carcassonne during a cruise on the elegant *Argonaut*.

Trans-Siberia September 3-25: Cross Siberia on the *Russia Express*. Depart for Outer Mongolia, Central Asia or Moscow.

Rome and Beyond September 6-21: Study the history and architecture of classical Italy. Spend six days in Rome; then go to Florence, Venice or the southern coast.

Oxford/Smithsonian Seminar September 13-28: An exciting program in its seventh year. Study with Oxford faculty, live in an academic setting and see historic villages.

Europe by Train September 18-October 7 or October 9-28: Europe's great trains are not just memories. Luxury, splendid vistas on *Orient Express*, Switzerland's *Glacier Express*, France's swift *TGV*.

Spain September 27-October 12: See the superb art and architecture of Madrid, then move on to serene Catalonia or Andalusia.

Peru September 28-October 13: Immerse yourself in the country's ancient civilization. Visit Lima, Cuzco, Machu Picchu.

Highlights of Austrian Civilization October 5-20: Enjoy the romance of Salzburg and Vienna; study their cultural heritage.

Adriatic Shores October 6-18: Cruise on the *Argonaut* to Yugoslavia, Italy, Korcula Island, Corfu, Ithaca.

Mediterranean World October 9-23: Take the *Illiria* to the classical centers of Greece, Sicily, Italy, Crete and Carthage.

India by Train October 30-November 15: A Smithsonian premiere! Exclusive use of a maharaja's "Palace on Wheels" to visit the glorious sites and cities throughout the state of Rajasthan.

Egypt and the Nile November 11-30: See bustling Cairo, then cruise the peaceful Nile aboard a chartered riverboat to explore renowned sites—Luxor, Dendera, Abu Simbel.

The Atlantic Crossing December 6-21: A sailing adventure from the Canary Islands to Martinique on the four-masted square-rigger *Sea Cloud*.

Coming in December: Spend this special season celebrating a traditional Christmas in Austria, Wales or Canterbury. Or, ring in the New Year: attend a festive traditional celebration in Russia while visiting cities and historic sites.

Write National Associates, Capital Gallery 455, Smithsonian Institution, Washington, DC 20560 or call (202) 287-3362 for tour brochures

n Washington

Smithsonian Seminars

Expand your educational horizons this fall as you combine a pleasure-filled visit to the nation's capital with stimulating week-long courses of study that highlight Smithsonian museums and research facilities. These purposeful vacation seminars give you the opportunity to share special interests with fellow Associates.

From October 27 through November 1, Smithsonian scholars will lead five exciting new seminars. In addition to a week of intensive study, participants will enjoy specialized field trips, a gala welcoming buffet, evening performances and an elegant farewell dinner. Hotel is optional. The fall 1985 seminars include:

Anthropology Today

Explore the diverse collections and current research at the Museum of Natural History during lectures, field trips, discussions with specialists in physical and cultural anthropology, archaeology and linguistics.

Perspectives on American Art

Curators from the National Museum of American Art will offer illustrated lectures, tours of the museum's exhibition, preparation and conservation areas. Trips to renowned Washington landmarks offer new insights on American art from the 18th century to the present.

Music of the Baroque Era

Enhance your enjoyment of this extraordinary music as you attend a unique program of lectures, demonstrations and performances on historic instruments by the Smithsonian Chamber Players.

Fossils: Archives of the Earth

Delve into the Earth's most distant past as you participate in discussions, hands-on workshops with actual specimens, and a daylong visit to fossil beds in the Shenandoah Mountains with geologists, paleobotanists and paleobiologists from the National Museum of Natural History.

Man's Quest for Wings: Highlights of Aviation History

Curators from the National Air and Space Museum will lead special tours of the museum and its restoration facility during this seminar, which features lectures and films that chronicle America's outstanding achievements in air and space.

or (202) 357-1350 for seminar brochures.

SHOW YOUR KIDS
HOW A FOREST IS LOGGED.

Dress 'em up in old clothes and sturdy shoes, and we'll take you all "into the woods" on a comprehensive tour of one of our logging sites.

You'll discover how lumberjacks and foresters work with computer programmers and lab scientists to sustain our forests ***and*** their yields forever. Your kids will go "Wow!"

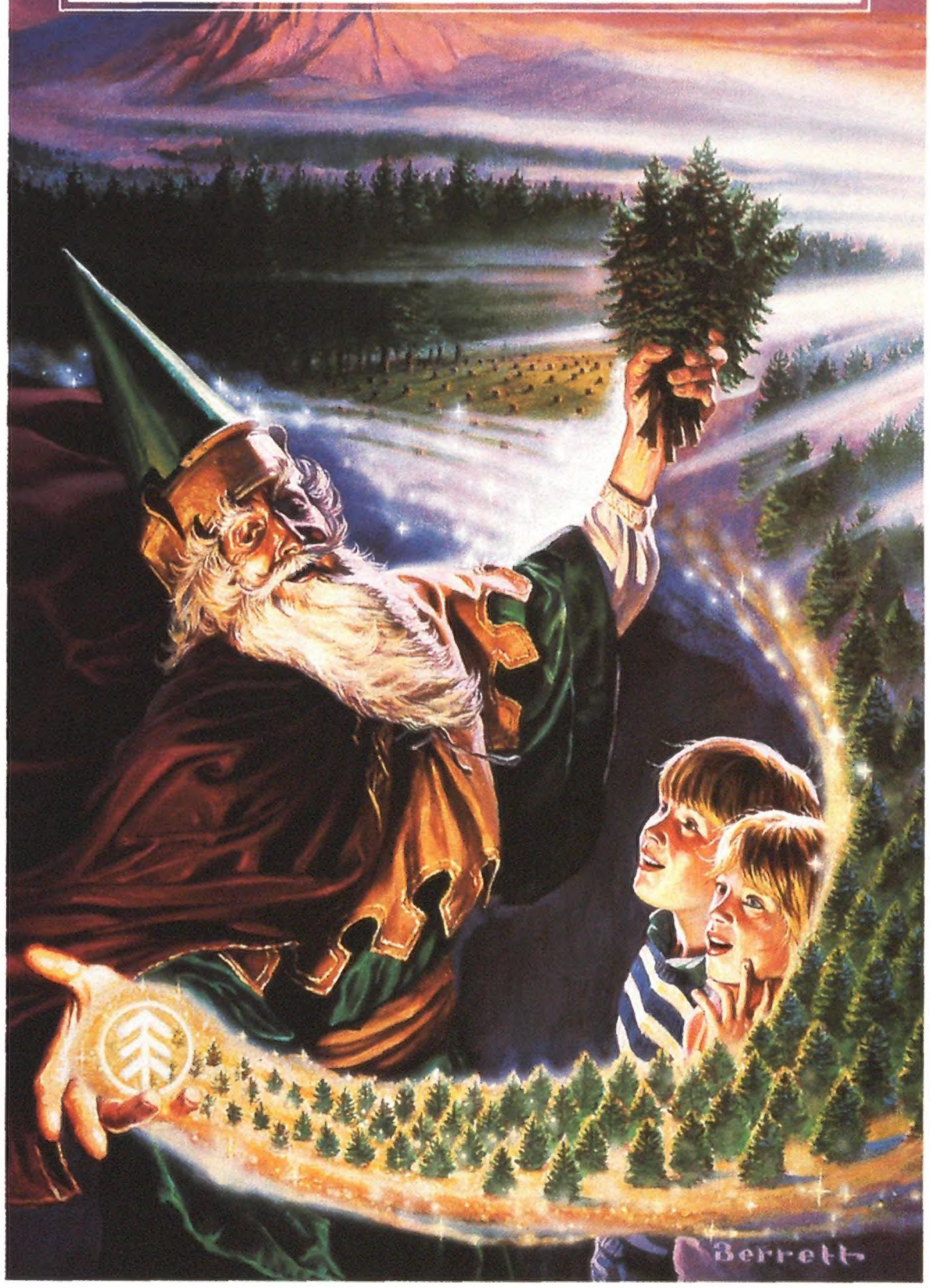
We offer you tours like this because we'd like you to understand that our mills and plants and logging sites serve your interests as well as ours.

And because we're proud of them.

For a list of tour locations, write Sharon Ramsey, Boise Cascade Corporation, One Jefferson Square, Boise, Idaho 83728.

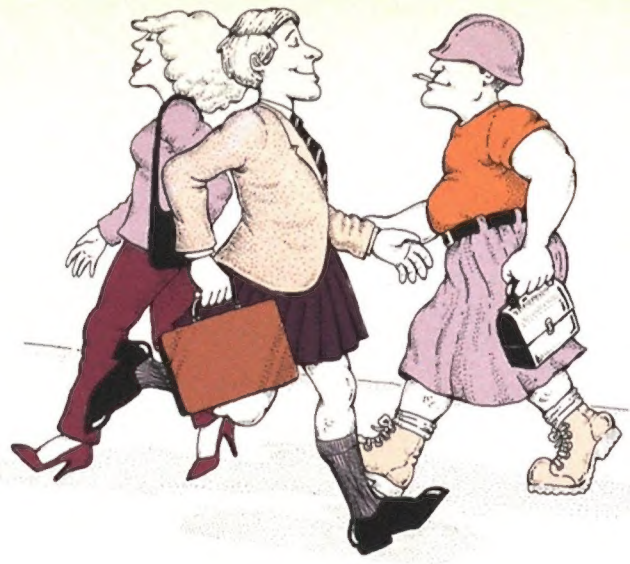
Boise Cascade Corporation

Paper/Office Products/Packaging/Building Products/Forests



By Kay Haugaard

If you've got the legs for it, guys, I say 'Go ahead'



The big fashion news is that (sartorially at least) men are going to be liberated, too. But let's not skirt the issue. In plain language, dresses and skirts keep being offered for men. In Los Angeles, designers Peter Cohen and Paul Batoon have turned out above-the-knee skirts. In New York, Julia Morton and Paul Monroe are designing chemises (read dresses) for men.

So what is the world coming to? Rampant female impersonation, transvestism, out-and-out decadence? What would the macho men of history think of all this?

Why don't we ask. "You, there, Alexander the Great, wearing your . . . uh . . . never mind!" What a shock to realize that Alexander the Great conquered the world in miniskirt and sandals.

Oh well, those Macedonians were pretty primitive. Maybe Alexander hadn't heard of trousers. Alas, the very Persians he conquered, not to mention the Chinese of the time, wore trousers. The Greeks and Macedonians knew about trousers all right, but were too dumb to realize trousers are innately masculine. They *preferred* skirts, regarding trousers as barbarian attire. I can see Pericles, Euripides and Plato standing together (never mind the chronology) in the long dresses they called chitons and sagely tsk-tsking that no civilized man should be caught dead in trousers.

Leaping a few centuries forward in Western history in a search for the properly trousered male, we pause a moment in ancient Rome before a sculpture of the Roman emperor Marcus Aurelius. Hmmm. The miniskirt is still in. Marcus wears a chic divided skirt below his armor. When not in his mini he wore a maxi like his Greek predecessors.

Moving right along to the Middle Ages we come to Charlemagne: warrior, conqueror, head of the Holy Roman Empire. Wouldn't he have blushed to wear a skirt? Nope! Skirts still prevail; minis, maxis and, by this time, also the medieval midi. But France is chillier than Greece, so some medieval leotards, or baggy tights (known as chausses), were added to the male wardrobe. Over this primitive panty hose men wore a dress called a tunic. For quiet evenings in the drafty manor, the emperor lounged in a loose-fitting, floor-length gown.

Blessed relief. By the Renaissance, the primordial ancestor of trousers made an appearance in Europe. This was a brief overgarment with divided legs. Remember Holbein's portrait of Henry VIII in a gathered skirt over puffy bloomers? No one impugned Henry's masculinity with impunity. And by the 18th century Henry's bloomers had crept down the legs to the knees and were called breeches. In short, sure-enough pants but still more like Little Lord Fauntleroy sissy-pants than real he-man pants. Even so, George Washington, Ben Franklin and Mozart were honored in the breeches.

Students of Western Civ may well ask how long men had to wait for true trousers and how came they to be thought manly? Patience! All in good time.

Now, a short digression is necessary to the Orient and Near East. In those parts people kept on wearing trousers as they had for centuries. In China, Japan and Persia, though, trousers did not make the man. Far from it. Harem ladies wore pants. In China, during the Qing dynasty, it was decreed that men would wear an outfit consisting of a kimono-style top attached to a pleated or gathered skirt. But only women of very high rank could wear this garment. Emperors and empresses wore robes of identical cut (early unisex). Most Japanese followed suit with both men and women decked out in long kimonos. The samurai, meanwhile, cast off *their* robes for a jumper-like garment with Joan Crawford shoulders and droopy pleated knickers.

Back in France, on the other hand, so to speak, only the male peasants wore pants (of which more later).

Not until almost the 19th century did long trousers make their *fashion* debut in Western Europe. It happened after the French Revolution began in 1789. The People did decidedly unpleasant things to some aristocrats. As a result, the remaining aristocrats and rich bourgeoisie began to feel uncomfortable in their silken knee breeches. Deciding they valued their heads more than sartorial elegance, they adopted an egalitarian style modeled after the long, baggy pantaloons of the French peasant. Off with foppish, decadent, aristocratic breeches! On with *liberté, égalité, fraternité* and the democratic simplicity of pantaloons!

With true Gallic élan, the French cut the new garment smartly, launching a style trend which soon spread in England with the aid of that fashion plate Beau Brummel. For a couple of decades pantaloons were long but very tight. By 1815 they had loosened enough to be recognized as grandaddies of modern trousers.

Presumably viewing the whole matter with amusement, while atavistically clinging to kilts, was a goodly parcel of tough, cudgel-carrying Scots, not to mention those elite Greek soldiers whose "dress" uniform featured short ruffled white skirts that do seem a little tutu.

Men wearing skirts? Why all the fuss and feathers? When women borrow traditionally male clothing people just think it's cute. So what the heck, let men be liberated too. It will lend new meaning to the expression "well-dressed man." I say, "Go ahead, Honey, provided you've got the legs for it."

How your long distance calls can stay precious for years to come.

AT&T Opportunity Calling℠ can turn a dollar of calls into a dollar of savings on everything from china to couches.

Now when you share good times over the phone, you can hold onto more than just the memories.

Because "AT&T Opportunity Calling" is a way to earn discounts on valuable merchandise such as Gorham china, crystal, and stainless—just by calling with AT&T Long Distance.

Any month you spend $15 or more on AT&T Long Distance, you'll earn a dollar of credit for every dollar you spend. Even calls made on the AT&T Card apply. And you can earn up to $300 credit per month.

Your credits are good for discounts on anything featured in the "AT&T Opportunity Calling" catalog. From jogging machines to jewelry. From strollers to a sailboat.

Just shop around for your best price. Your credits will save you even more—wherever you find it.

See your "AT&T Opportunity Calling" catalog for more details. Or if you haven't received your catalog, call **1 800 992-0992.**

So call the friends and relatives you hold dear. And you'll find your calls can bring you closer to things you'll always treasure, too.

With "AT&T Opportunity Calling," the rewards of calling long distance don't stop when you hang up the phone. **Reach out and touch someone.®**

AT&T
The right choice.

©1985 AT&T Communications

NISSAN INNOVATION STRIKES AGAIN.

NEW 1986 STANZA WAGON. THE FIRST AND ONLY WAGON WITH DUAL SLIDING DOORS.

It took Nissan to come up with a way of getting you around, designed for how you live today. The 1986 Nissan Stanza Wagon. From how you get in it, to what you get out of it, this wagon is unlike any you've ever experienced before.

It's the only wagon with sliding doors on both sides. Which not only makes the Stanza a cinch to get in and out of in a tight parking space…it also makes it a cinch to get to its 80 cu. ft. of cargo space. And to the extra seating provided by its optional jump seats. It's powered by a 2.0 liter fuel-injected engine. And, with front-wheel drive, it handles as crisply as any car you've ever driven. It comes to you with a full array of standard equipment. From a state-of-the-art tilt steering column to an electronically-tuned AM/FM stereo. It's aerodynamically stylish. Technologically modern. And logically right on the money.

The 1986 Nissan Stanza Wagon opens up a whole new side to family transportation. Your Nissan/Datsun dealer can show it to you today. If you're looking for innovation… The Name is Nissan.

BELT YOURSELF

THE NAME IS **NISSAN**